ENGINEERING NEWS-RECORD

JANUARY 13, 1944

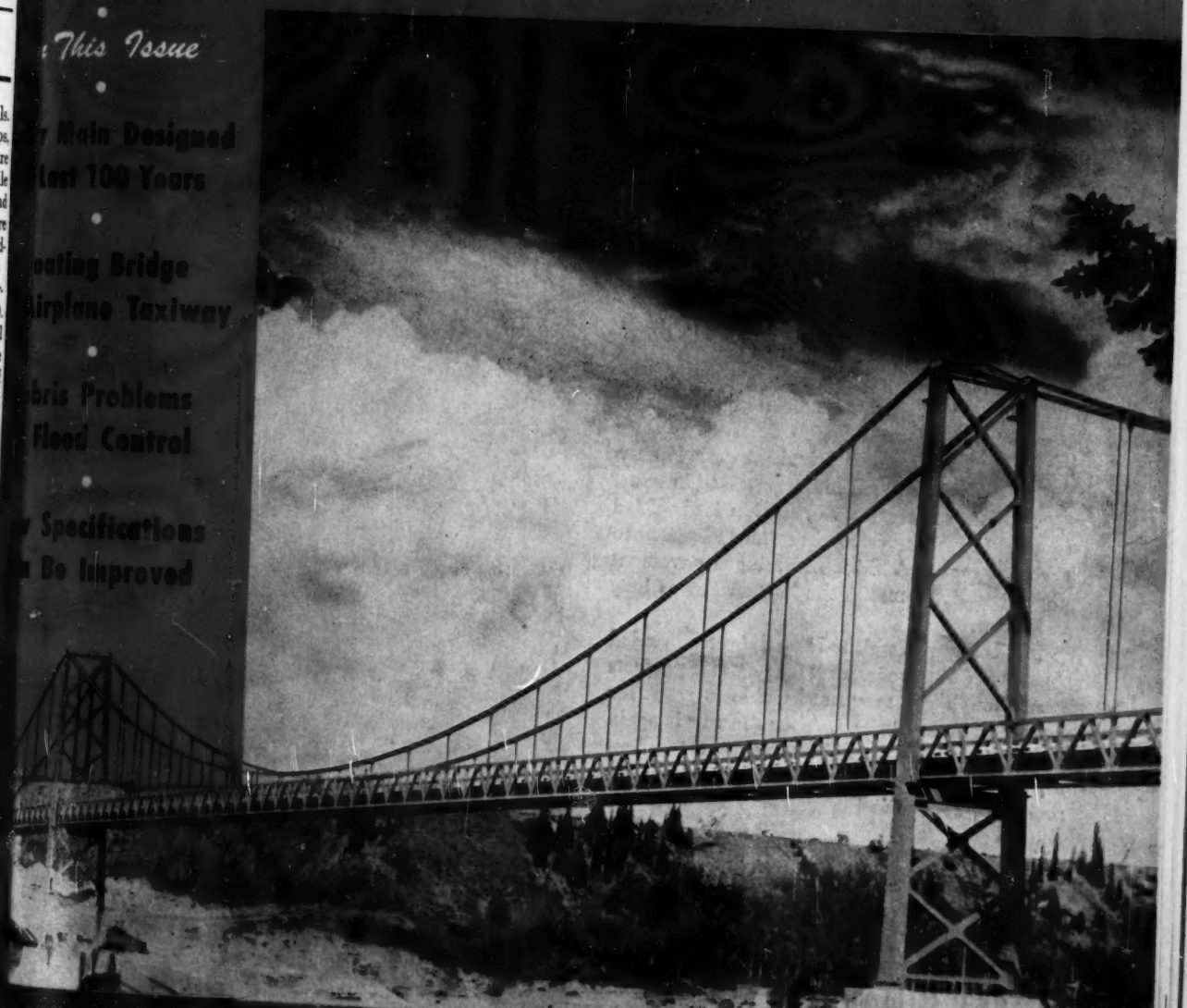
This Issue

Main Designed
Last 100 Years

oating Bridge
irplane Taxiway

bris Problems
Flood Control

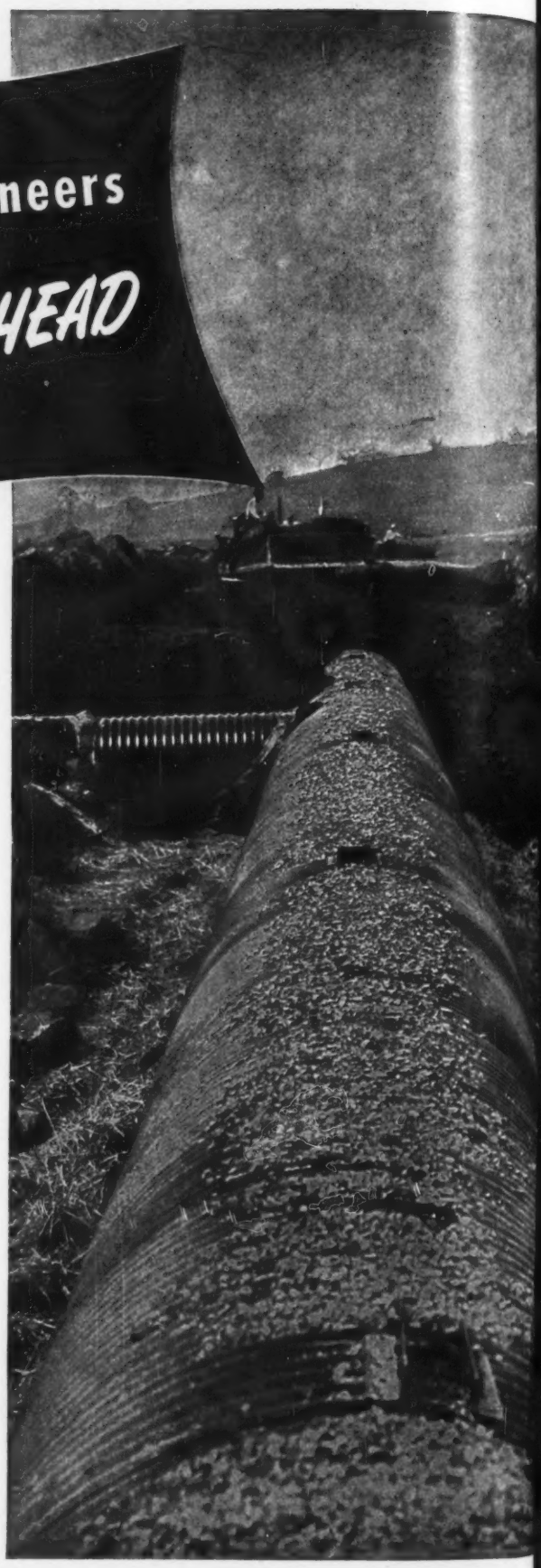
Specifications
Be Improved



0-ft span suspension
which carries the Alas-
way across the Peace
n British Columbia

Record Set On Peace River Bridge — See Page 64

For Sewer Engineers WHO ARE LOOKING AHEAD



Future-thinking engineers will be interested in this airport drainage story: To provide a stream enclosure over which a new runway could be constructed, 1570 feet of 54-inch pipe was required. Strength and durability were essential. Designers solved the problem with Asbestos-Bonded Paved Pipe.

The flexible corrugated metal design of ARMCO Pipe prevents breakage; and band couplers make for strong, tight joints. Longer lengths and fewer joints mean lower installation costs. Cradling is unnecessary. Corrosion is shackled by a full bituminous coating tightly bonded to the base metal. A thick bituminous pavement checks erosion—makes the bottom last as long as the top.

It will pay you well to keep Asbestos-Bonded ARMCO Sewer Pipe in mind for post-war projects even though you may not be able to get it for immediate construction. After the war it again will be available to help solve your toughest sewer problems. Armco Drainage Products Association, 15 Curtis Street, Middletown, Ohio.

ARMCO

ASBESTOS-BONDED ARMCO SEWER PIPE

CONSTRUCTION TRENDS

Notes on significant movements in the construction industry

Postwar Prospects for Unclassified Construction

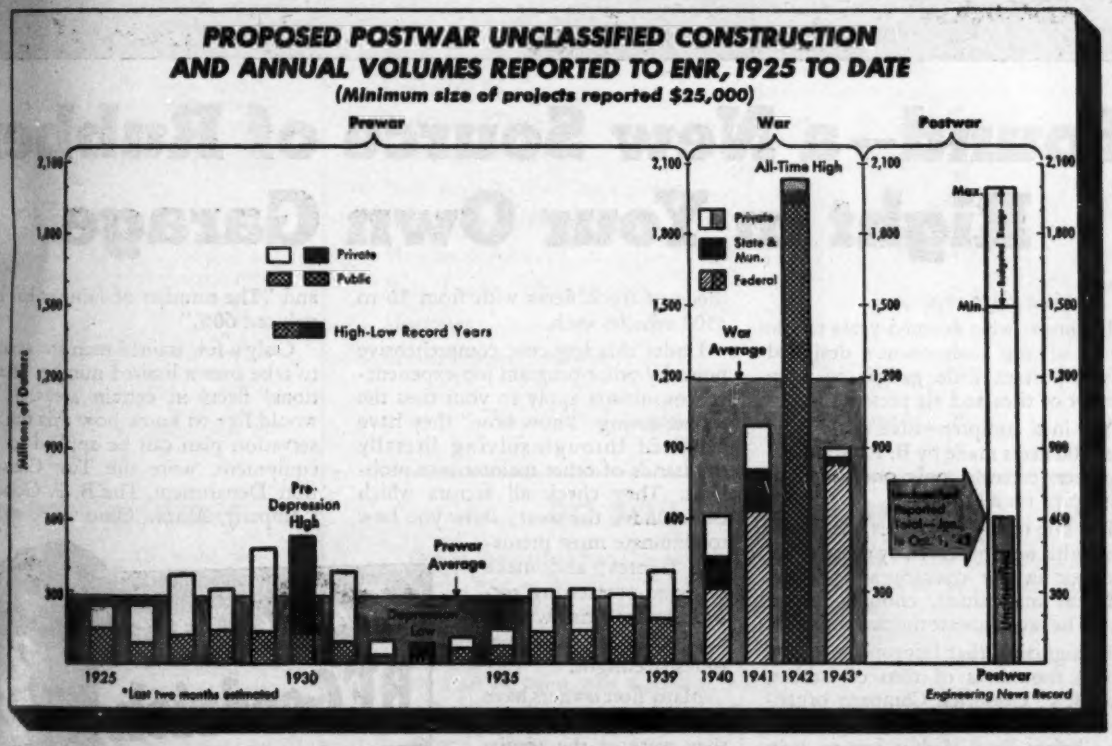
UNCLASSIFIED CONSTRUCTION projects—airports, tunnels, subways, parks, pipelines, etc.—proposed for postwar construction total $610,773,000 for the first nine months of 1943. This volume ($536,048,000, public; and $74,725,000, private) is 17.6 percent of the $3,476,987,000 postwar project volume for all types of civil engineering construction reported during the period to *Engineering News-Record*.

The *ENR* postwar unclassified construction budget, based on an assumed national income of $150,000,000,000 per year, is estimated at $1,500,000,000 to $2,000,000,000 per year, which includes major transportation terminal reconstruction in crowded cities.

With $610,773,000 already reported in the identified-projects backlog, 41 percent of the *minimum* annual volume budgeted for unclassified construction has entered the proposed work stage, and 31 percent of the *maximum* budgeted total has been earmarked for this type of work in the years immediately after the war.

Middle West states report $259,917,000 in proposed unclassified construction projects, 42.5 percent of the nine-month U. S. total for 1943. The Middle Atlantic states volume, $130,006,000, is 21.3 percent of the *ENR* postwar total; West of the Mississippi states, $112,739,000, 18.5 percent; Far West states, $89,691,000, 14.7 percent; Southern states, $9,858,000, 1.6 percent; and New England, $8,562,000, 1.4 percent.

Unclassified proposed postwar project volume so far reported compares less favorably with the postwar "budget" than some other classes of construction. War needs for this class of construction produced a record high volume, $2,034,000,000 in 1942, that will probably stand for some time. This preview of postwar planning of unclassified construction, however, indicates that annual postwar volume should exceed any previous peace year by a wide margin.



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Found—a New Source of Rubber Right in Your Own Garage

This is a valve cap.

Engineers who devoted years to the study of tire maintenance designed this important little gadget to keep dirt *out* of tires and air pressure *in*.

Yet in a comprehensive analysis of over 300 fleets made by B. F. Goodrich engineers recently, only one fleet had valve caps on all tires!

It is safe to say that if this one rule of tire health were observed by every truck operator in the country and proper inflation maintained, enough rubber would be saved to ease the tire shortage.

Recognizing that improper tire care wastes thousands of tons of rubber, The B. F. Goodrich Company organized a Tire Conservation Department long before Pearl Harbor just to help fleet owners conserve rubber.

This department, staffed by factory-trained men, has since that time taken over the complete supervision of all tire maintenance problems for hundreds of truck fleets with from 10 to 3500 vehicles each.

Under this low-cost comprehensive point-by-point program job-experienced consultants apply to your tires the rubber-saving "know how" they have acquired through solving literally thousands of other maintenance problems. They check all factors which cause undue tire wear; show you how to eliminate most premature failures; and make mileage-stretching recommendations which cut your costs — sometimes overnight.

Many fleet owners have written to say how amazed they were at the results obtained. Typical of their comments are: "We believe we will show a 25% saving," or "It saves far more than it costs," and "The number of failures has been reduced 60%."

Only a few trained men are available to take over a limited number of additional fleets in certain areas. If you would like to know how this tire conservation plan can be applied to your equipment, write the Tire Conservation Department, The B. F. Goodrich Company, Akron, Ohio.

ENGINEERING NEWS-RECORD

Devoted to Buildings, Sewers, Waterworks, Bridges, Roads, Dams, Foundations, Earthwork, Flood Control, Public Works, Shipbuilding, Irrigation, Canals, Railroads

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JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

Vol. 132 JANUARY 13, 1944 No. 2

COMING NEXT

• Another look at the Alcan Highway. H. W. Richardson reports in the Jan. 27 issue on what happened to the highway and its bridges last winter, how the problems raised by frost and ice were met and what changes were being made this year to improve the road and minimize future trouble.

• Plans are being made for a road-building program of unprecedented size after the war. These plans will be appraised in the Jan. 27 issue, and details will be given as to how four states—New York, Illinois, Louisiana and California are laying the groundwork for a quick start on a big program at the end of the war.

• Other articles of interest to highway engineers will describe how Ohio is adding median dividers to highways in the region of Columbus; what was done by the bridge department of Arkansas to repair a badly damaged bridge under traffic, and how salt is being used on roads at a big ordnance depot to insure keeping the roads open.

• Also featured in the Jan. 27 issue is a story on Building a Hospital In Ecuador, where earthquakes was only one of many problems that had to be considered in design and construction; Cost Comparison of Plain and Reinforced Concrete Reservoirs; Reconstruction of Timber Bridges to Meet War Traffic Demands, and A Method of Bending Steel Bilge Plates, which cut fabricating cost 70 percent.

THINGS TO COME

• Norfork Dam is soon to be completed, thus adding another source of power for the Nation's war industries. The project is of special interest because of the use of 284-ft. span cableways, the longest yet used for this type of work; addition of limestone dust to improve concrete workability; use of ice to control concrete temperature in summer; unusual layout of the aggregate plant, and measures taken to provide flood storage, despite inability to secure desired tainter gates.

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Number of copies of this issue printed: 36,011

DO YOU WANT AN INDEX?

Due to the paper shortage, no index for the current volume (July-December, 1943) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below.

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Small quantities of Reinforcing Steel may be obtained without an allotment number or preference rating, as follows:

1 Pursuant to paragraph (d) (4) of CMP Reg. No. 4, 10/19/43, governing sales by Warehouses, any person may obtain up to a total of 10 tons of all Steel Products in any one calendar quarter, on Certification only.

2 Pursuant to CMP Reg. No. 6, 6/30/43, governing Construction and Facilities, a person may obtain not in excess to one ton of Steel for individual projects, under the small order provision.

3 Pursuant to CMP Reg. No. 9A, 11/25/43, Repairmen may obtain up to a total of 20 tons on a Certification only.

4 On orders in amount of $10.00 or less, under CMP Reg. No. 4, 10/19/43, no Certification is required.

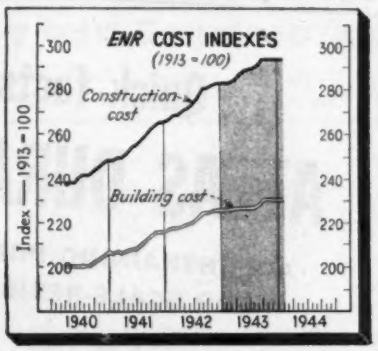
RYERSON REINFORCING STEEL-SERVICE

MONTHLY CONSTRUCTION BUSINESS SUMMARY

ENR CONSTRUCTION VOLUME AND NEW PRODUCTIVE CAPITAL

(,000 omitted)	December 1942 (5 wk.)	December 1943 (5 wk.)	% Change	Twelve Months 1942 (53 wk.)	Twelve Months 1943 (52 wk.)	% Change†
Continental U. S. Construction	$373,622	$176,460	−53.0	$9,305,829	$3,061,844	−66.0
Private Construction	13,279	41,199	+210.0	555,823	491,298	−10.0
Public Construction	360,343	135,261	−62.0	8,750,006	2,570,546	−70.0
Federal	344,895	124,614	−64.0	8,241,088	2,373,987	−71.0
Total New Productive Capital	$15,063	$7,976	−47.0	$10,219,318	$3,073,080	−69.0
Private Investment	14,063	7,476	−47.0	399,977	153,064	−61.0
Federal (non-federal work)	1,000	500	−50.0	240,155	166,178	−29.0
Federal (federal work)	.....	.....	.....	9,579,186	2,753,838	−71.0
ENR Construction Volume Index, 1913 = 100	227	103	−55.0	553**	176**	−68.0

† *Adjusted for difference in number of weeks reported.* ** *Twelve-month average.*



CONSTRUCTION COSTS . . . . WAGE RATES . . . . MATERIAL PRICES

	January 1943	January 1944	% Change	Changes December to January: Dec. 1942	Jan. 1943	%	Dec. 1943	Jan. 1944	%
ENR Construction Cost Index, 1913 = 100‡	283.45	294.57	+3.9	283.69	283.45	−0.1	294.51	294.57	*
ENR Building Cost Index, 1913 = 100‡	226.87	231.55	+2.1	226.63	226.87	+0.1	231.49	231.55	*

‡ *Does not reflect increased costs due to more overtime, lower labor efficiency, delivery, delays, etc.*

ENR 20-CITIES' AVERAGE

Common Labor	$0.832	$0.869	+4.5	$0.832	$0.832	0	$0.869	$0.869	0
Skilled Labor (Av. 3 trades)	1.606	1.620	+0.9	1.599	1.606	+0.4	1.620	1.620	0
Bricklayers	1.700	1.715	+0.9	1.693	1.700	+0.4	1.715	1.715	0
Structural Ironworkers	1.661	1.673	+0.7	1.661	1.661	0	1.673	1.673	0
Carpenters	1.457	1.472	+1.0	1.442	1.457	+1.0	1.472	1.472	0
Cement, per bbl.	$2.60	$2.62	+0.8	$2.60	$2.60	0	$2.62	$2.62	0
Reinforcing steel	2.70	2.79	+3.3	2.70	2.70	0	2.79	2.79	0
Structural steel, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
Sand, per ton	1.21	1.23	+1.7	1.21	1.21	0	1.23	1.23	0
Lumber, 2x4 Fir, per M ft.	51.47	53.32	+3.6	51.55	51.47	−0.2	53.20	53.32	+0.2
Lumber, 2x4 Pine, per M ft.	43.97	48.96	+11.4	44.33	43.97	−0.8	48.96	48.96	0
Brick, common, per M	15.66	16.25	+3.8	15.66	15.66	0	16.15	16.25	+0.6
Ready-Mixed concrete, c.y.	7.38	7.42	+0.5	7.37	7.38	+0.1	7.42	7.42	0
Struct. clay tile, 3x12x12-in.	78.93	79.34	+0.5	78.47	78.93	+0.6	79.34	79.34	0
Paving asphalt, cars, ton	14.88	15.25	+2.5	14.92	14.88	−0.3	15.35	15.25	−0.7

* *Less than .05 percent change.*

ENR INDEX NUMBERS

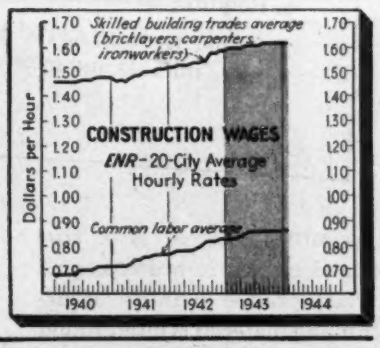
Base = 100	Construction Cost 1913	Construction Cost 1926	Building Cost 1913	Building Cost 1926	Volume '13	Volume '26
Jan., 1944	294.57	141.60	231.55	125.17	...	...
Dec., 1943	294.51	141.57	231.49	125.14	103	45
Nov., 1943	294.41	141.52	231.39	125.08	149	65
Oct., 1943	294.31	141.47	231.29	125.03	142	62
Sept., 1943	294.09	141.37	231.20	124.98	155	68
Aug., 1943	291.38	140.07	228.49	123.51	119	52
July, 1943	289.92	139.36	227.89	123.19	175	77
June, 1943	289.94	139.37	227.71	123.09	204	89
May, 1943	289.87	139.34	227.64	123.06	203	89
April, 1943	288.80	138.83	227.50	122.98	225	99
Mar., 1943	285.24	137.11	226.66	122.53	228	100
Feb., 1943	283.48	136.27	226.90	122.66	231	101
Jan., 1943	283.45	136.25	226.87	122.64	172	76
Dec., 1942	283.69	136.37	226.63	122.51	227	100
1943 (Av.)	289.95	139.38	228.75	123.66	176	77
1942 (Av.)	276.31	132.82	222.39	120.22	553	243
1941 (Av.)	257.84	123.95	211.46	114.32	375	164
1940 (Av.)	241.96	116.31	202.81	109.64	269	118

MATERIAL SHIPMENTS . . . . BUILDING PERMITS

	December 1942	December 1943	% Change	Nov. 1943	% Change Nov.-Dec.
Steel (% operating capacity) A.I.S.I.	98.3	95.5	−2.8	98.8	−3.3

	November 1942	November 1943	% Change	Eleven Months 1942	Eleven Months 1943	% Change
Fabricated structural steel, tons, A.I.S.C.	130,425‡	35,152‡	−73.1	1,894,686‡	754,121‡	−60.2
Cement, thous. bbl., U. S. B. of M.	14,653	8,405	−42.7	176,312	121,925	−30.8
Building Permits, 215 cities, Dun & Bradstreet, (,000 omitted)	$34,747	$48,362	+39.2	$758,377	$466,722	−38.5

‡ *A.I.S.C. data on revised basis; tonnage now reported for bridge and building construction only.*



COST OF LIVING INDEXES . . . . EMPLOYMENT

	November 1942	November 1943	% Change	Oct. 1943	% Change Oct.-Nov.
Cost of Living Index, N.I.C.B.	100.5	103.7	+3.2	103.7	0
Rent (Housing) Index, N.I.C.B.	90.8	90.8	0	90.8	0
Total Employment (est.), thous., B. L. S.	38,478	38,251	+0.6	38,276	−0.1
Constr. Employment (est.), thous., B. L. S.	2,028	865	−57.4	974	−11.2

ENGINEERING CONSTRUCTION CONTRACTS—ENGINEERING NEWS-RECORD—DECEMBER, 1943

Engineering News-Record *reports continental U. S. Construction projects of the following minimum cost—waterworks, excavation, drainage and irrigation,* $15,000; *other public works,* $25,000; *industrial buildings,* $40,000; *other buildings,* $150,000

Five Weeks—Thousands of Dollars (000 Omitted)

	New England	Mid Atlantic	South	Mid West	West of Mississippi	Far West	United States December 1943	United States Twelve Months 1943	United States Twelve Months 1942	Canada
Public Works										
Waterworks	196	586	242	296	262	239	1,821	46,055	150,965	31
Sewerage	252	447	884	965	625	387	3,560	40,783	118,437	143
Bridges, public	15	150	118	298	713	340	1,634	29,919	49,268	25
Earthwork and waterways	182	52	59	47	2,436	1,128	3,904	47,380	251,328	65
Streets and roads	55	747	2,600	1,799	1,476	1,380	8,057	227,186	530,504	1,600
Buildings, public	1,487	14,154	17,878	14,554	12,547	20,234	80,854	1,419,357	5,678,103	1,238
Unclassified, public	2,256	1,933	8,156	1,713	8,333	13,043	35,431	768,866	1,971,401	2,075
Total Public	**4,443**	**18,069**	**29,934**	**19,672**	**26,392**	**36,751**	**135,261**	**2,570,546**	**8,750,006**	**5,177**
Federal Government (included in above classifications)	4,225	17,029	27,680	17,060	24,618	34,002	124,614	2,373,987	8,241,088	.....
Private										
Bridges, private	.....	25	.....	80	900	.....	1,005	4,881	890	.....
Industrial Buildings	620	2,870	40	3,749	10,239	1,088	18,606	166,834	200,319	1,393
Commercial Buildings	1,928	5,585	625	1,150	2,770	6,843	18,901	230,546	291,763	500
Unclassified, private	.....	35	873	25	1,230	524	2,687	89,037	62,911	.....
Total private	**2,548**	**8,515**	**1,538**	**5,004**	**15,139**	**8,455**	**41,199**	**491,298**	**555,823**	**1,893**
Total Engineering Construction:										
December, 1943 ..... 5 weeks	6,991	26,584	31,472	24,676	41,531	45,206	176,460	.....	.....	7,070
November, 1943 ..... 4 weeks	9,433	22,987	42,439	24,001	68,072	36,100	203,632	.....	.....	6,656
December, 1942 ..... 5 weeks	28,080	39,954	139,434	32,519	57,218	76,417	373,622	.....	.....	12,449
Twelve Months 1943	144,144	493,056	673,316	371,930	730,442	738,956	.....	3,061,844	.....	119,005
Twelve Months 1942	466,976	1,225,390	1,930,172	1,587,922	2,466,930	1,628,439	.....	.....	9,305,829	225,148

Quick facts about
ATLAS DURAPLASTIC*

AIR-ENTRAINING PORTLAND CEMENT FOR SCALE-RESISTANT PAVING

1. Complies with current Federal and ASTM specifications.
2. Renders concrete pavements highly resistant to scaling due to the action of salts used for ice removal.
3. Protects concrete against the effects of freezing and thawing weather.
4. Minimizes segregation and bleeding. Concrete is more uniform throughout and more durable.
5. Permits earlier finishing.
6. Requires no additional materials at the mixer.
7. Called DURAPLASTIC because it makes concrete more durable and more plastic.

Lawrence Street, Appleton, Wisconsin, where the right lane was laid with Atlas DURAPLASTIC in July, 1940, at the same time normal portland cement was used for the left lane. Photo taken in 1943 shows the results of three winters of of identical salt de-icing treatment.

Atlas DURAPLASTIC is a true portland cement in which a small but very precise quantity of air-entraining material is interground during manufacture. Its commercial announcement in 1943 followed five years of research by Universal Atlas in the laboratory, in the plant and on actual jobs. Some of these are now in their fifth winter. All are practically scale-free. They are described in the following articles, reprints of which will be furnished on request:

Engineering News-Record 10/10/40—Article on original research and test road.

Roads and Streets Nov. 1943—Article on DURAPLASTIC pavements in Milwaukee, Appleton and Chicago.

Engineering News-Record 12/30/43—Article on DURAPLASTIC pavements in Minneapolis after four winters of de-icing treatment.

Our Technical Service Bureau will furnish detailed information on the use of Atlas DURAPLASTIC—the cement that makes concrete scale-resistant. Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

• • •

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ENR-D-4

ATLAS DURAPLASTIC CEMENT
A Universal Atlas Product

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • JANUARY 13, 1944 • VOLUME 132 • NUMBER 2

Restriction on new building to be relaxed, says WPB

Director of WPB's Facilities Bureau announces plans to make possible civilian use of materials produced in excess of war requirements.

The War Production Board has under consideration plans for relaxing its restrictions on building, Roy W. Johnson, director of the WPB's facilities bureau, said in an address Jan. 4, before the Priorities Association of Philadelphia.

"We have increased production of basic materials to the point that there are some slight amounts left over after meeting all the requirements of today to go into the finished war product," he said. "The big problem now is to relax moderately the restrictions on construction, to utilize the slight excess materials now being produced over those required to win the war, and to direct the use of these materials to those channels where they will do the most good in maintaining war and essential civilian requirements. This means giving consideration to a great many factors, some of which are the availability of labor and increased loads on the transportation systems.

No large surplus of labor

"It is estimated that approximately seven and one-half billion dollars worth of construction was done in this country last year. The estimate for 1944 is about three and eight-tenths billion. This naturally will require only about one-half of the building trade mechanics who were working in 1943. Justifiably one might conclude that that many additional workers would be available for war work, but that is not the case. It is known that during the last great depression very few young men learned trades along these lines. As a result of this, the majority of building trade mechanics are older men, and unless there are war plants in the immediate vicinity of their homes, these men generally will not become war workers.

"There are certain places throughout the country where construction labor seems available. Materials are also available locally. The question at hand is—would it be detrimental to the war effort to permit certain types of construction to proceed in these localities?

"One other possibility," he went on, "would be to change the definition of maintenance and repair as now used in Order L-41, and use the word 'customary' instead of 'necessary.' This would permit for example, the repainting of a building even though the repaint job was not absolutely necessary to the preservation of the building. It would permit owners of property to do limited quantities of repair work at the time it is customarily done rather than have to wait until the repairs are dangerously deferred.

"Another relaxation might be accomplished through modification of other conservation orders of the WPB which would permit the manufacture of certain products not now being made, such as steel sash, brass valves, etc., the manufacture of which was stopped because of the lack of sufficient basic materials. We might also change the criteria by which all applications are now judged to permit work to proceed where labor and materials are available at the site.

"One other method of providing for

(*Continued on page* 58)

British Combine Photo

An American bulldozer does its stuff in Italy

One of the things that has hampered the advance of the Fifth Army in the Italian campaign is the mud which has made it difficult to move heavy equipment.

On the Roccamonfina sector recently, operations were at a standstill for several days because of the effects of unfavorable weather conditions. Only one third-class road was available for transport, and that was in a very bad state. There were also a few cart tracks, but, after a few hours of use, they became seas of mud.

The photograph reproduced above shows a bulldozer pulling a heavy truck out of the muck—typical illustration of the efficient work this powerful piece of American contraction equipment is now doing on all of the fronts of this global war.

G. O. Smith, former head geological survey, dies

George Otis Smith, 72, director of the U. S. Geological Survey for 23 years, died at Skowhegan, Me., Jan. 10. After receiving his Ph. D. from the Johns Hopkins University in Baltimore, Mr. Smith joined the geological survey as an assistant geologist in 1896. He was appointed its director in 1907 by President Taft, serving continuously until 1930, when President Hoover appointed him chairman of the Federal Power Commission.

One of Mr. Smith's first acts as chairman was to discharge several members of the commission, in a controversy over Federal operation of public utilities, which caused the Senate to ask the President for an opportunity to reconsider its approval of Mr. Smith's appointment. The President declined, and the Senate took the matter to the courts. The final decision by the U. S. Supreme Court upheld President Hoover. Mr. Smith's stand on public utility regulation was that he opposed government operation of utilities and that he believed regulation of the utilities had been successful.

Mr. Smith was former president of the American Institute of Mining and Metallurgical Engineers, a director of the Central Maine Power Co., and a trustee of Colby College.

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Four Carnegie-Illinois steel units halted by WPB

The War Production Board in Washington Jan. 5 announced it had ordered a halt in construction of four Carnegie-Illinois Steel alloy steel units valued at $1,658,000 because, it said, additional steel of this type is no longer needed in the war effort. No contracts had been awarded.

The four projects ordered halted, WPB said, are located at Munhall and Braddock, Pa., Chicago, Ill., and Gary, Ind.

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Rochester engineers oppose charter change

Rochester, N. Y., engineers protested to their city council recently against proposed elimination of charter requirements that the city director of planning and superintendent of municipal enterprises be licensed engineers.

At hearings on local laws proposing to supplant the existing law with a requirement that the superintendent of municipal enterprises have five years of practical experience in mechanical, industrial or electrical engineering work and the director of planning five years of practical experience in planning work, representatives of engineering groups held that the present requirement calling for engineers should not be modified, particularly in wartime.

Appearing were Howard S. Thomas for Rochester chapter, National Society of Professional Engineers; R. C. Schwind, Rochester section, American Society of Civil Engineers, and Frank H. Macy, of the legislative committee of the Rochester Engineering Society.

Thomas held the local laws would modify the state law requiring engineers where decisions on planning matters are concerned.

"We hate to see the law amended in wartime," he said, "when so many engineers are in service. We cannot understand why the requirements should be let down, or why the local law should reduce requirements of the state law."

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Sanitary Corps advanced to new status in Army

The Sanitary Corps of the Army, which has been functioning as a subdivision of preventive medicine in the Office of the Surgeon General, was elevated to the status of a separate division on Jan. 1. Col. W. A. Hardenbergh, chief of the Corps since its formation, now holds the title of director.

Coincident with this change, announcement was made of the promotion of Joseph J. Gilbert to lieutenant-colonel from major, and the appointment of Col. Gilbert to the post of assistant director of the division.

Data on the number of men in the Sanitary Corps cannot be made public at this time, but it has been revealed that the engineering personnel alone is more than 6½ times greater than in the last war. Some of the functions of the Corps are outlined in *ENR* April 24, 1941, p. 605.

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Big new appropriation sought for access roads

A bill has been introduced in Congress asking for an addition of $55 million to the $260 million authorized by the amended Defense Highway Act of 1941 for access roads, the amount to be available throughout the war emergency. The bill also provides that the Commissioner of Public Roads is authorized to provide—in sections certified to the Federal Works Administrator, Secretary of War, or Secretary of Navy as maneuver areas—"for such improvement and construction as may be necessary up to $5 million total."

Producers' Council seeks to improve specifications

A move has been started by the Producers' Council, Washington, to improve specifications prepared by architects and engineers by elimination of the clause "or equal" when specifying acceptable materials and equipment. The council proposes that the specification writer specify certain materials and equipment by name. These specifications would also state that bidders are at liberty to submit an alternate on products considered to meet the specifications, stating what additions or deductions from his bid should be made if the alternate is approved. Specification writers could overcome the criticism that mention of a product by name favors that manufacturer by rotating the list of products considered satisfactory, the council points out.

The council's plan has been approved by the American Institute of Architects. Local meetings of the institute and engineering groups are planned to aid in carrying out the proposal.

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U. S. field parties survey New England dam sites

Lt. Col. Edgar W. Garbisch, district engineer of the Providence United States Engineer District, announced Jan. 7 that the surveys and borings required for the design of the proposed Williamsville Reservoir in Vermont are practically completed. This is the project which is meeting opposition from some Vermonters, as reported last week.

Within the next ten days, the Engineers' field parties, which have been making these investigations at the Williamsville site, will move on to the sites of other reservoirs and flood control works. The Providence Engineer District has been authorized to make these studies at Williamsville and the other locations as part of an authorized postwar planning program.

The Williamsville Reservoir is the most important of the twenty reservoirs in the comprehensive plan for flood protection in the Connecticut River basin as approved by Congress. The other reservoirs and flood control works whose design has been authorized in the postwar planning program in the Providence Engineer District are located in Vermont, New Hampshire, Massachusetts, Connecticut and Rhode Island.

The work of the Providence District personnel in designing these postwar flood control works is limited to that which will not interfere with the most expeditious prosecution of the Engineers' military activities.

Gov. Dewey urges New York's surplus be set aside for postwar construction

State will have a treasury surplus of $140 million, which, it is suggested, should be used for highway work and other employment-producing projects immediately after the war.

In his annual message to the 1944 legislature last week, Governor Thomas E. Dewey of New York proposed that the state's $140,000,000 treasury surplus be frozen immediately in a new reconstruction fund to finance public projects and create employment in the conversion period following the war.

"This state surplus is not ours to spend at this time or to give away in the remission of taxes, the governor said. "We hold it only as trustees. It belongs as much, even more, to the men who are fighting the war. When they return it must be available to meet the needs of that critical period."

Highway work needed

The governor spoke particularly of the state's need for highway construction and repairs.

"Even before the war our state system of roads and highways had been allowed to deteriorate. In terms of modern traffic requirements much of it had become obsolete. This condition has been aggravated by the curtailment of new construction during the war.

"When the war is over and materials are again available the state must be prepared to undertake very extensive repairs, modernization and new construction. In so doing it will have an opportunity to contribute greatly to post-war re-employment and to the stimulation of industrial recovery. We must make ready now by clearing away some of the obstacles that have previously hampered the proper development of our highway system.

"One of the most important of these obstacles has been the acquisition of rights-of-way. For this the state has hitherto been dependent upon the action of individual counties.

State should buy rights of way

"I now recommend that the state be authorized to acquire and pay for necessary rights-of-way in order that the post-war program of highway construction may be carried out. In this connection I also recommend that the state should pay for the building of those parts of its arterial highways which are to pass through cities.

"The legislature has previously authorized the construction of a system of connected thruways intended to give our state the best highways in the world. The time has now come when funds should be appropriated to permit work to be started on these thruways as soon as men and material are available."

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Industrial building now tends toward conversions

Emphasis during 1944 in the field of industrial engineering and building will be placed definitely on design work for postwar plant conversions, expansions and additions, according to members of the H. K. Ferguson Co., including vice presidents C. A. Harwick and J. Stuart Sneddon. Among the pertinent points emphasized are the following:

Reconversions of plant facilities already are under way in some instances. Many government plants have shut down. Some are being—and have been—actually converted to other purposes. Others are being dismantled. The result is that we are entering industrial conversion much like we would be going into a real estate boom. Nobody knows the full picture.

Some construction materials are now available for use in sufficient quantities—among them steel and lumber—but controls are still being maintained by government agencies. By late summer we can hope for War Production Board releases on certain items.

A shortage of designing and construction engineers is likely to develop. It is therefore important for corporations to plan early—to make detailed drawings, specifications; to write up and actually place purchase orders for future delivery. Men are now available; competent organizations are intact.

The peak in building costs has not yet been reached. Postwar costs will be higher per unit than war costs. A run-away market may be expected once the postwar building program starts. That's a factor to consider in drawing up plans now, having them ready just as soon as materials are available for "civilian" consumption. By having them finished early, top market prices can be avoided.

It is true that the country is "overbuilt" in total volume of factory floor space. But the floor space is generally not located in the proper places for economical use. The reasons are legitimate, the principal one being that sites for wartime plants and sites for peacetime plants don't have the same requisites.

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Elizabeth, N. J., citizens share water profits

An operating surplus of between $400,000 and $500,000, attributed to increased industrial consumption of water, will be divided among consumers early this year through rebates on first quarter bills, the Elizabeth, N. J., Board of Water Commissioners announced recently.

Such discounts have been common since municipal ownership of water was adopted in 1931. The surplus for 1943 to be split among consumers, however, was described by the board as an all-time high.

During October, water consumption reached its peak in Elizabeth's history, an average of 9.7 million gallons daily. This compares with 9.4 million gallons daily during October, 1942. In the pre-war year, October, 1938, had a daily consumption which averaged 7.3 million gallons.

Municipal ownership of water was acquired on the recommendation of city officials on a capital outlay of approximately $5,000,000. The financial benefits accruing have been brought about without any taxation costs to the city.

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Pacific war will be hard on construction machines

Maj. Gen. Eugene Reybold, recently back from an inspection of Engineer units in the Southwest Pacific area, emphasizes that there will be a great need for heavy construction equipment there for some time to come. By nature, amphibious warfare is destructive.

Not only are machines in the Pacific war theater subject to abnormal wear and tear, they are also prey to enemy action and thus sudden destruction, said General Reybold. Every landing costs valuable construction equipment.

"Even though we are procuring and distributing practically the total output of this class of equipment," says General Reybold, "there is still not enough of it to go around." He mentions the bulldozer as the all-round favorite among the troops because it does more things well than any other machine, even to attacking Jap pillboxes and machine gun emplacements. Shovels, draglines, cranes, piledrivers, well drilling rigs, pumps, dump trucks, rollers, graders, rock crushers and paving machinery are also necessary.

News of the engineering schools

Dr. Harvey Nathaniel Davis, president of Stevens Institute of Technology, Hoboken, N. J., and director of the Office of Production Research and Development, War Production Board, has been elected an honorary member of the Institution of Mechanical Engineers in England, the college has announced.

He is the fourth living American so honored. The others are Henry Ford, Prof. A. G. Christie of Johns Hopkins University and Orville Wright.

Dr. Davis returned recently from England, where he had been on a government mission for the OPRD and the combined production resources board of Great Britain, Canada and the United States.

Plans for the public safety institute of Purdue University to offer assistance to Indiana cities in making postwar improvements in traffic control and public safety were announced recently by Director J. L. Lingo.

The new program, made possible through the cooperation of the Indiana state highway commission and the Indiana state police, will include traffic engineering and control. It has been developed in cooperation with the Indiana Economic Council.

An irrigation conference is to be held at Utah State Agricultural college Jan. 20 and 21 for irrigation research workers of 11 western states. Representatives from Oregon, Washington, California, Nevada, Arizona, New Mexico, Montana, Idaho, Wyoming, Colorado and Utah will participate.

In recognition of the vital importance of flood control and waterway engineering to Louisiana and the lower Mississippi Valley, Louisiana State University has created a new school of hydraulic engineering, it was announced Dec. 21 by Governor Sam H. Jones. With advanced engineering developments, the chief executive said, Louisiana can carve "25,000 additional farms of 160 acres each" from areas requiring drainage or adequate flood protection.

WASHINGTON HIGHLIGHTS

The construction of temporary or permanent public works for the establishment of naval shore activities, in an amount not to exceed $200,000,000, is provided for in S. 1550 recently introduced in Congress and referred to the Senate Committee on Naval Affairs. The bill provides authority "to continue or complete the construction of any project heretofore authorized or undertaken," in the following amounts: fleet facilities, $4,000,000; aviation facilities, $25,000,000; storage facilities, $20,000,000; ordnance, $60,000,000; personnel training and housing facilities, $81,200,000; shore radio facilities, $5,000,000; Naval Research Laboratory, $800,000; miscellaneous structures, $4,000,000.

Applications for construction of projects costing less than $25,000 can now be filed with and processed by the regional offices of War Production Board, instead of having to go through the Washington office. Formerly such projects, when handled by the regional offices, were limited to $10,000. To speed up processing of applications to a still further extent, the regional offices may designate district offices to process the applications. Furthermore, the applicant may apply to a district office if he is located nearer to one than he is to a regional office. "Blanket-authorizations" totaling less than $25,000 may also now be processed in the field, provided no one of the construction jobs concerned amounts individually to over $10,000.

The chief of engineers of U. S. Army is directed to make periodic examination of all dams constructed across navigable waters and their tributaries, in S. 1599 introduced into Congress by Senator Clark of Missouri. When a dam is found to be operated in such a way "as to jeopardize the safety of persons or propery either above or below" the dam, the chief of engineers is authorized to require necessary changes.

A Branch of Power Utilization has been established within the Bureau of Reclamation, with Harvey F. McPhail as director. The new branch will be responsible for developing the utilization of all power generated at Bureau of Reclamation plant. It will give advice on power marketing studies, and on methods of encouraging development of public power distribution agencies and regional industrial development. Later it will review power rate schedules and contracts.

Mr. McPhail, the director, a graduate of the University of Nevada, has been with the bureau 25 years. The last 15 years he has been assistant chief electrical engineer in the bureau's engineering office at Denver. Headquarters at first will be in Washington, but later at Denver.

The War Production Board has issued Schedule 13 of Limitation Order L-211, concerning steel pipe, in amended form in order to point out specifically what comes under its provisions, and also what specifications are required, since applications were coming in to WPB for pipe not covered by the order. No changes are made in the regulations, but additions were made to the preamble, thus clarifying the coverage of the order.

Steel pipe is defined as "carbon steel, alloy steel (chromium content less than ten percent), open-hearth iron and wrought iron pipe, customarily used only as an integral part of any pressure or vacuum piping system for the purpose of conveying any material. However, the term does not include oil country tubular goods, water well tubular products, steel pressure pipe, and steel pressure tubes . . . nor does it include corrugated pipe, dredge pipe, and forge welded pipe," which are covered by other schedules.

While pipe over 48 in. in diameter may be produced to any specifications, that under 48 in. must follow certain given specifications, including those of the American Society for Testing Materials, standard specifications of the American Water Works Association, and material specifications of the American Society of Mechanical Engineers. If the pipe is for use by the government, specifications listed include eight special governmental ones, such as those of the Navy.

The new schedule also points out that diameter and wall thickness of pipe of 48 in. or less are also prescribed.

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Big road plans proposed for North Carolina

Governor J. M. Broughton of North Carolina says the state's postwar road construction program might not have to wait until the end of the war, and has suggested that the department start immediately making plans and surveys to start work within 30 days after materials and labor again become available. The state has a surplus of over $35,000,000 in highway funds and about $11,000,000 in federal funds have been earmarked for the state. He said that the impending construction program will be the greatest since the $50,000,000 appropriation made years ago at the beginning of the state's primary road system.

Activity on the Postwar Front

As the war continues to progress favorably for the Allies, and hopes, at least, arise that victory and peace may not be too long delayed, postwar plans are becoming more definite in many states and communities. Some of the latest developments in various sections are as follows:

Pennsylvania — The state's postwar highway program calls for spending, over a 5-year period, approximately $500,000,000, according to Governor Edward Martin. Improvements will be made in Pittsburgh, Philadelphia and Harrisburg, and in rural areas. Taxes will take care of $36,000,000 of the expense, said the governor, and if the federal government assumes $50,000,000 of the cost, "we will need an additional one cent per gallon gasoline tax to finance the plan."

Arkansas—Construction of a multiple-purpose barge canal, and an irrigation, drainage and flood control system in the Bayou Meto drainage basin have been proposed by L. A. Henry, engineer-director of the state planning board.

Winona, Minn.—A. T. Wiczek, president of the city council, says that progress had been made in planning post war construction. A special public works committee will study tentative plans for six projects—a city levee wall, improvements of the harbor, continuation of a paving program, development of a modern airport, construction of two new sewage ejector houses and the continuation of a curb and gutter program, which was halted by the war.

Milwaukee, Wis.—A 6-year program plans expenditure of $22,248,093 for new bridges, sewers, buildings, street widening, land purchases, and street extensions.

Nashville, Tenn. — A 7,500-seat municipal auditorium to cost $1,500,000 is being considered.

Kansas City, Mo.—Construction of a 3,400-foot tunnel through the bluff west of Baltimore Ave. for the extension of Fifteenth St., and a viaduct to Kansas City, Kan., to cost $5,425,000, have been suggested. John M. Picton is chief planning engineer.

Halifax, N. S.—Program announced by the mayor and city council: revising of building codes and standards, slum clearance, creation of new residential sections, back lanes for municipal garbage collection, new schools, churches and other public buildings, and additional recreational spaces. The city has been asked by the mayor to buy a 30-acre golf course, and convert it into a new residential development. The town council of Dartmouth advocates construction of a steel or concrete bridge from Halifax to Dartmouth across Halifax harbor. The provincial government has been asked to interest the dominion government in building the bridge, the two governments to share the financing.

Hastings, Minn.—One of the most ambitious post-war construction programs for a small town was announced on Dec. 6, by City Manager T. A. Brown. The program includes the construction of a new $900,000 bridge; plans by the U. S. Engineers for the completion of the second lock in a Mississippi River dam, to cost approximately $500,000. and expenditures of $150,000 for public improvements.

Gastonia, N. C.—W. M. Piatt, Durham, N. C., consulting civil engineer, has been retained to plan and supervise a program. Among projects under consideration are the extension of water and sewer lines, street paving work, construction of a city warehouse, and enlargement of city buildings.

Winnipeg, Man.—Erection of a new city hall is under consideration as a postwar project. Built in 1886, the present city hall is said to be out of date, and is located in a section which has changed considerably. It is suggested that the new building be built near the civic auditorium on the Mall, and that this new district adjacent to the parliament buildings be developed as a civic center.

New Jersey—Sigvald Johannesson, head of the state highway planning bureau, has recommended replacement of 717 bridges and widening of 704 others as part of the postwar program.

Oklahoma—Chairman Ben T. Childers of the Oklahoma State Highway Commission has announced that it is putting two survey parties into the field and will double the drafting force to complete plans for a post-war highway building program. The preparations are in expectation of a $60,000,000 federal contribution for a 3-year period, representing 75 percent of the cost, with the state furnishing the remainder. Among the projects under consideration is a new and more direct route between Tulsa and Oklahoma City.

Oregon — A postwar flood-control plan for the Willamette valley, to provide employment for returning service men, is under study by executive committees of the Portland and Eugene chambers of commerce. The plan calls for seven dams on the Willamette river, five of them in Lane County. The Eugene planners urge creation of a reserve fund by maintaining present tax levies, said Fred G. Sticksel, chairman. About $100,000,000 in emergency public works projects have been earmarked for the transition period.

Lt. Col. Ralph A. Tudor, district U. S. Army engineer at Portland, has announced a postwar construction program for the Columbia basin, including power development, irrigation, navigation and flood control. He has requested $250,000 annually for five years to complete the district program. Aid will be sought from the Bureau of Reclamation, Bonneville Power Administration and Federal Power Commission.

Iowa—Fred White, chief engineer of the Iowa highway commission, says that Iowa's share of the country's contemplated $3 billion expenditure would be $72,000,000. With Iowa's own contribution, the state would have $96,000,000 for postwar highway work. Half of this would go to primary road work, one-fourth to municipal streets, and one-fourth to county trunk and local roads.

Texas—A review of Texas natural resources, transportation, and needed construction of public works will be among the first steps taken by the new State Postwar Economic Planning Commission. Gibb Gilchrist, former state highway engineer, who now is dean of engineering at Texas A. & M. College, is chairman of the commission appointed by Gov. Coke Stevenson, as authorized by the legislature. The commission's principal task, Gilchrist said, will be to fit returning service workers into the peacetime economy. This will entail a statistical study of labor distribution in Texas and the possibility of converting war plants to peacetime manufacture.

The commission authorized Gilchrist to appoint an executive committee, of which he will be chairman. Included in the eleven-point program are plans that call for political subdivisions to finance public works programs as much as possible without federal aid, and a study of the use and conservation of Texas water supplies and power, along with all natural resources.

JOBS OF THE WEEK

CANTONMENT, Stapleton, N. Y.

U. S. Engineers, New York, N. Y., awarded a contract for constructing Fox Hills Cantonment to Thompson Starrett Co., Inc., New York, N. Y., at $1,003,795.

ADVANCED BASE DEPOT, Port Hueneme, Calif.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for constructing, site improvements, electrical installation for advanced base depot to Raymond Concrete Pile Co., Turner Construction Co. and Morrison-Knudsen Co., New York., at $44,777,375. Cost-plus-fixed-fee.

ADVANCED BASE DEPOT, Davisville, R. I.

George A. Fuller Co. and Merritt-Chapman & Scott Corp., have been awarded a contract by the Bureau of Yards & Docks, Navy Department, Washington, D. C., for advanced base depot to cost $22,500,000. Cost-plus-fixed-fee.

HOUSING, Pascagoula, Miss.

Public Housing Authority, Atlanta, Ga., awarded contract for the construction of 540 dwellings, to R. P. Farnsworth & Co., Inc., New Orleans, La. The estimated cost is $1,168,000. Landry & Matthes, Hattiesburg, Miss., are the engineers and architects.

PLANT, Illinois

Thorgerson & Ericksen Co., Chicago, Ill., has been awarded a contract to construct 1 and 2-story, 250x600 ft. malleable iron factory and office by Defense Plant Corp., Washington, D. C. The estimated cost is $2,000,000. Albert Kahn Associates Engineers & Architects, Inc., Detroit, Mich., are the engineers and architects.

PIPE LINE, Wyoming

Stanolind Pipe Line Co., Casper, Wyo., has been awarded a contract by the Petroleum Administration for War, Washington, D. C., for 230 miles of crude oil pipe line between Wyoming and Montana border, near Casper, Wyo. The estimated cost is $4,200,000. Seventy miles of line will be 8-in. pipe and 160 miles of 10 in. pipe. The line will have a 21,500 barrels daily capacity.

DWELLINGS, Vallejo, Calif.

Housing Authority of City of Vallejo received the lowest bid from Robert McCarthy Co., San Francisco, for 1,000 family dwelling units and community buildings in Flodsen School area, at $1,744,879.

MILITARY BUILDINGS, Mexico

National Defense Committee, Mexico City, Mexico, will construct with its own forces military buildings, to include army camps, schools and hospital. The estimated cost is $1,000,000.

RUNWAYS, TAXIWAYS, etc. Matagorda Peninsular, Texas

Consolidated Contractors, Edna, were the lowest bidders for work at airport, including runways, taxiways, and apron expansion for U. S. Engineers, Galveston, Tex., at $802,000.

ROADS, Mexico

Mexican Government, Avila Camacho, president, Mexico City, will construct by its own forces roads for 1944 program at an estimated cost of $20,000,000.

STREETS, Mexico City, Mexico

Central Department, Federal District, Mexico City, will construct a street between Calle Republica de Brazil and Calle de Gabriel Leyva; also widen streets in northern section of the city by its own forces. The estimated cost is $500,000.

TRESTLE SHIPS PIER, Earle, N. J.

J. Rich Steers, New York, N. Y., has been awarded a contract by the Bureau of Yards & Docks, Navy Department, Washington, D. C., to build an additional trestle ships pier at Naval Ammunition Depot at a cost of $2,660,000.

DWELLINGS, Los Angeles, Calif.

Realty Construction Co., Los Angeles, Calif., will build by its own forces 153 frame and stucco dwellings. The estimated cost is $600,000. James R. Friend, San Pedro, is the architect.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 157.

Building restrictions to be relaxed

(*Continued from page 53*)

relaxations would be the increasing of dollar limitations as now set up in Order L-41. The difficulty of this approach is that it could readily interfere with the war effort because of the critical labor shortages in certain areas throughout the country.

Lumber still critical material

"There is one very critical material—lumber. The production of lumber at the present time is far below the requirements; therefore, we can permit no lumber in construction beyond that which is absolutely necessary."

Mr. Johnson said lumber stockpiles are practically non-existent, that this material is in great demand for crating of items to be shipped overseas, and that it seems unlikely that lumber production can be increased.

Other changes in WPB Order L-41, which is that governing construction, are now being worked out to reduce from three to two the forms for filing applications. One of the two will be for housing projects and the other for other types of construction, thus eliminating the form which was used exclusively for small jobs under $10,000. Mr. Johnson made no forecast as to when any of these changes would be put into effect.

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Pure water is promised for Philadelphia

As soon as he took office Jan. 3, Mayor Bernard Samuel of Philadelphia, Pa., pledged a pure water program for the city. He committed himself, his administration, the City Council and the new City Planning Commission to:

1. Purification of the city's present sources of drinking water—the Delaware and Schuylkill rivers—by the elimination of pollution through completion of sewage disposal facilities and extension of the underground drainage system.

2. Consideration of the feasibility of tapping upland sources for the city's water supply, the question to be studied by a commission to be appointed by the Mayor and its report to include the basis of a plan for financing the project.

The Mayor said: "It is imperative that we clean up our rivers, and I am determined that this project shall be a 'first' in our postwar works program. There is no evading this issue and we intend to be prepared with complete construction plans and the financing to execute it."

OBITUARY

Edwin Dewitt Coddington, 78, of Woodbury, Conn., vice president of the Wisconsin Bridge and Iron Co. from 1893 to 1935, died Dec. 25. An engineering graduate of the University of Illinois, Mr. Coddington was well known in the structural steel fabricating field, and more recently in the housebuilding field for a number of useful inventions. Among these were automatic rivet and punching machines and a product known as E-Cod fabric, a combination of aluminum foil, wire mesh and stucco for house walls. After retirement from Wisconsin Bridge, Mr. Coddington was associated with the Reynolds Corp. in marketing E-Cod for several years, and then engaged in house building in Manhattan, Long Island and Connecticut.

J. W. Elliott, 68, for ten years associate bridge engineer of the Virginia Department of Highways, died Dec. 31. He was formerly a professor of engineering at the University of Vermont and was subsequently associated with Virginia Bridge and Iron Company of Roanoke, and the Atlantic Bridge Co., of Greensboro, N. C.

Thomas A. Cleland, 81, an associate of the late George Westinghouse, and, until his retirement, superintendent of construction for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., died Dec. 25.

James T. Pardee, 76, chairman of the board of the Dow Chemical Co. for 6 years before he retired in 1941, died at Midland, Mich., Jan. 3. Mr. Pardee was active for forty-six years in the Dow company and its predecessor, the Dow Process Co. He became secretary and treasurer of the original company in 1895 after several years in Cleveland as an eigineer and a builder of bridges, drydocks and other harbor improvements. In 1893, Mr. Pardee was chosen by the city to be engineer in charge of bridges and viaducts.

Abner Frank Brown, 77, civil engineer, died at Reidsville, N. C., Dec. 27. Until his retirement two years ago, he was Rockingham County Surveyor and formerly was with the State Highway and Public Works Commission.

News of the Week
Continued on p. 105

CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction volume in continental U. S. totals $98,680,000 for the week, the highest weekly volume reported since July 15, 1943. This total, not including construction by military engineers abroad, American contracts outside the country, and shipbuilding, is 357 percent above a week ago, and 86 percent above the total for the corresponding 1943 week.

Private construction declines 28 percent from last week, but is up 79 percent compared with last year. Public construction is 549 and 86 percent higher, respectively, than a week ago and a year ago.

The current week's volume brings 1944 construction to $120,277,000 for the two-week period, an increase of 3 percent over the $117,041,000 reported for the opening two weeks of 1943. Private construction, $12,328,000, is 55 percent higher than last year, but public work, $107,949,000, is 1 percent lower as a result of the 58 percent decrease in state and municipal engineering construction volume.

In the classified construction groups, gains over last week are in waterworks, industrial and public buildings, and unclassified construction. Increases over the 1943 week are in bridges, industrial, commercial and public buildings.

New capital for construction purposes for the week totals $508,000, and is made up entirely of state and municipal bond sales. The week's new financing brings 1944 volume to $133,621,000, a total that compares with the $678,000 for the corresponding two-week period in 1943.

CONTRACTS

Continental U. S. Only (Thousand of Dollars)

	Week Ending Jan. 14 1943	Jan. 6 1944	Jan. 13 1944
Federal	$49,827	$12,288	$92,570
State & Municipal	420	2,126	965
Total public	$50,247	$14,414	$93,535
Total private	2,866	7,183	5,145
TOTAL	$53,113	$21,597	$98,680
Cumulative 1944 (2 weeks)			$120,277
1943 (2 weeks)			$117,041

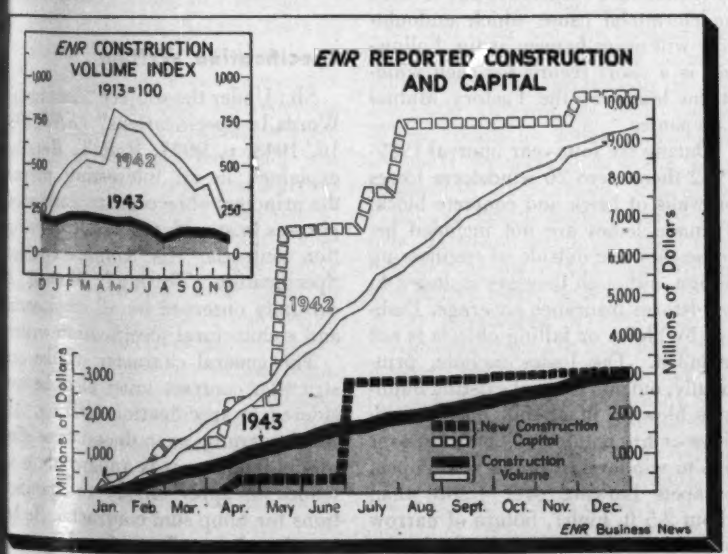
Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

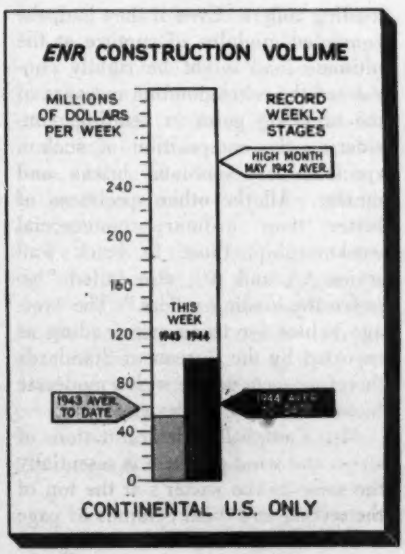
NEW PRODUCTIVE CAPITAL

	Cumulative 1943 2 weeks	1944 2 weeks
NON-FEDERAL	$678	$42,789
Corp. Securities	....	42,000
State & Mun. ..	678	789
FEDERAL	....	$90,832
TOTAL CAPITAL	$678	$133,621

ENR INDEX NUMBERS

Index base=100		1913	1926
Construction Cost	Jan. '44	294.57	141.60
Building Cost	Jan. '44	231.55	125.17
Volume	Dec. '43	103.	45.


ENR CONSTRUCTION VOLUME INDEX
1913=100
1942
1943
J F M A M J J A S O N D
ENR REPORTED CONSTRUCTION AND CAPITAL
Millions of Dollars
New Construction Capital
Construction Volume
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
ENR Business News



Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Wind Pressure on Walls

Sir: In reply to Mr. Campbell's inquiry, *ENR* Nov. 18, 1943, p. 735, regarding the age of the 200 ft. x 50 ft. brick wall which blew over, the top of the wall had been completed about two weeks. As it was a large wall, the portion near the base was undoubtedly over a month old. Complete failure occurred partly at the concrete foundation and partly on top of the first course of bricks.

In questioning the value of 31 psi, Mr. Campbell mentions that all failures at the Bureau of Standards occurred *at* the loading rollers and therefore may have been local failures due to shear instead of tension. The report BMS5 states on page 10 under transverse load for the brick wall "AB" with ordinary commercial mortar workmanship, which was used in the writer's study, "Each of the specimens failed by rupture of the bond between the bricks and the mortar at a bed joint *between* the loading rollers. In each case the failure occurred at a joint between a header course and a stretcher course." Although the writer did not see the specimens after test and does not have further data regarding the failures, it is his interpretation of the report that *none* of the brick specimens failed *at* the loading rollers. Even if they had, the computed modulus of rupture at the ultimate load might be rightly considered the corresponding measure of the breaking point in bending, considering the composition of such a specimen of combined bricks and mortar. All the other specimens of better than ordinary commercial workmanship, those in brick wall series AA and AC, also failed "*between* the loading rollers." The average values for transverse loading as reported by the Bureau of Standards therefore seem usable with a moderate factor of safety in design.

Mr. Campbell's determination of stress and wind pressure is essentially the same as the writer's at the top of the second and third columns of page 630, *ENR* Oct. 21, 1943. It neglects the mortar tension, as Mr. Campbell states. The mortar and workmanship in the wall that failed were excellent. For similar construction it seems safe to give credit to the mortar. The writer showed, in the second column on page 621, the effect of good mortar. For much weaker construction, such as old deteriorated mortar, it would be advisable to neglect mortar tension, admittedly.

The writer would not advocate too close figuring for masonry walls, because of some uncertainties regarding wind loads and workmanship. A moderate factor of safety in design seems desirable under the conditions. The chief recommendation is that walls conform to revised codes which take into account such data as is now available regarding the strength of walls and the maximum wind loads due to straightaway winds. When more extensive data are available, design values will doubtless be improved.

If the reported wall failure during a moderately strong windstorm was the only instance experienced, Mr. Campbell might be justified in suspecting some other contributing causes of failure, aside from simple inadequate design to meet likely wind conditions. A brief summary of losses is needed to show that this was no extremely rare occurrence due to some undetermined cause which undoubtedly will never happen again. Following is a short record for such windstorm losses of the Factory Mutual Companies.

During the four-year interval 1939-1942 there were 26 windstorm losses on walls of brick and concrete block. Tornado losses are not included because they are outside of engineering design, although they are included in windstorm insurance coverage. Damage by blown or falling objects is not included. The losses include, principally, outside walls of existing buildings blowing in or out, inside partitions or fire cutoff walls blowing over due to windows or doors being open, parapets blowing over (more than about 2.5 ft. high), failure of narrow brick piers between individual window frames, failure of masonry walls below long continuous windows, and interior and exterior walls during construction of buildings before installation of windows, doors and roof. Incidentally some of the walls were strengthened, when rebuilt, by application of the method objected to by Mr. Jacob Feld on p. 734, *ENR* Nov. 18, 1943. The above record is for only a short interval and for only one insurance inspection department, so presumably for all insurance organizations handling windstorm coverage in this country and Canada over an extended period, the wall record is probably not of minor importance. Furthermore, there are many structures owned by the U. S. Government, by states, municipalities, etc. which are not covered by windstorm insurance and therefore not included in any statistics of windstorm insurance.

In addition to the wall damage, there are also involved the resulting water loss due to broken sprinkler pipes, rain damage, and potential injury to persons. Losses during the New England hurricane of September, 1938, are not included in the above record although wall damage was large, due principally to inadequately anchored wooden roofs lifting and thus removing lateral bracing for the top of the walls. Incidentally, the need of roof anchorage and design of walls is covered in Factory Mutual Loss Prevention Bulletins 7.10 and 7.13.

H. A. SWEET,
Engineer, Associated Factory Mutual Fire Insurance Cos.
Boston, Mass.

Specification Writing

Sir: Under the subject "Ambiguous Words In Specifications" (*ENR*, Dec. 16, 1943, p. 902), Rolf T. Retz has explained in an interesting manner the principal objections to ambiguous phrases in specifications for construction contracts. His "Guides To Clear Specification Writing" should be carefully observed by all engineering and architectural specification writers.

The general character of the construction contract must also be considered in specification writing. Mr. Retz's warning as to the adverse effect of ambiguous words apparently is intended to apply chiefly to specifications for lump sum contracts. He has mentioned the effect of ambiguity in

specifications for unit price contracts. Even in the latter it is wise to eliminate many of the phrases mentioned. For example, the "lines and grades established by the engineer," if varied materially from those shown on the plans, might seriously increase the unit costs, due not only to extensive change in quantities or character of materials, but also in the extent and kind of construction equipment required to perform the work.

When included in specifications for cost-plus-a-fixed-fee contracts, ambiguous phrases such as "to the satisfaction of the engineer" would often be permissible or at least harmless. However, it might be possible for an unreasonable engineer to cause increase in costs under such terms, to such an extent as to result in a claim for additional fee on the part of contractor.

Since detailed specifications often are not written until some time after the signing of cost-plus-a-fixed-fee contracts, and while the cases mentioned above probably would occur only under the most unusual conditions, the competent specification writer will observe a uniformity of good judgment, impartially and ethical practice in all specifications. The only excuse for ambiguous specifications is either incompetence or dishonesty. Surely, few engineers will be guilty of dishonesty and none should write specifications who cannot avoid the stigma of incompetence.

HENRY H. JEWELL
Chevy Chase, Md.

Composite Action

Sir: In Mr. Tratman's abstract of the A.R.E.A. report, "Impact Tests on a Railroad Bridge," *ENR*, Dec. 16, p. 899, conclusive evidence was given that the steel girders and concrete deck of the bridge in question acted together in resisting live load moments. This composite action resulted in an appreciable reduction in the lower flange stresses and in a considerable reduction in the upper flange stresses. These reductions point to the practicability of effecting considerable saving in steel by taking account of composite action in design.

Although few engineers would care to rely solely on bond stress and rivet heads to resist horizontal shear, it is entirely feasible to provide positive and reliable mechanical anchorage by attaching shear lugs or shear connectors to the upper flange of the girder and imbedding them in the deck. These shear connectors should be designed to resist the horizontal shear at the junction between the girder and the deck, as computed from the properties of the composite section. If composite action is secured in this manner, it is then possible to consider it in design. The dead load of both the girder and the deck is carried by the girder alone unless the girders are shored up during construction of the deck. The live loads are carried by the composite structure.

The economies which can be effected in this type of design depend on a number of factors. If the stress in the lower flange governs the design, the savings will not be very great. On the other hand, if the stress in the upper flange governs, the large reduction in this stress due to composite action will permit the use of a smaller section even if the girder is symmetrical.

If the use of an unsymmetrical girder is allowed, still greater reductions in section are possible. The use of an unsymmetrical section will do little to change the location of the neutral axis of the composite section, since this location is controlled primarily by the section of the deck. Thus the live load stress in the upper flange will remain a small proportion of that in the lower flange. However, if a girder with a smaller upper flange than lower flange is used, the dead load stresses, which are carried by the girder alone, will be greater for the upper flange than for the lower. The total dead and live load stresses in the two flanges can thus be made more nearly in proportion to the allowable stresses for each flange. Where composite action is provided by shear connectors, it would seem reasonable to consider the upper flange as being laterally supported over its entire length. If such were the case, the allowable stresses for the two flanges would be equal.

The advantages of designing for composite action are now being recognized in the field of highway bridges. An article, "Design of Slab and Stringer Highway Bridges," by N. M. Mewmark and the writer, which appeared in *Public Roads* for Jan.-Feb.-Mar. 1943, deals with one method of designing highway bridges for composite action. A proposed procedure for the design of shear connectors is also given in this article.

It is to be hoped that the possibilities of designs considering composite action will be studied by both railroad and highway engineers.

C. P. SIESS
Special Research Associate in Theoretical and Applied Mechanics, University of Illinois

Application Forms

Sir: Many of the employee application blanks being used by American corporations are an insult to American business and to the American working man. I recently had called to my attention the case of a very prominent engineer and construction man who wrote to a company, in response to their advertisement, that he was available, and that he would take a job as foreman on an hourly basis. This man has for many years past made not less than twelve thousand dollars a year. He is not broke, but he wanted to keep at work. Along with his letter he sent his complete record and a very fine list of references. In return he received an application blank which it would seem could only have originated in a Fascist country.

If in order for a man to get a job in America it is necessary to answer such idiotic questions, to say nothing of the impertinence of such questions, then I maintain America has come to a new low level. For instance, it is asked: What is your religion? What church do you attend? What insurance policies do you carry? What is the name of your bank?

In addition to all of this, a man is required to give the names and addresses of all members of his family, including his wife's immediate relatives, and finally the application has to be taken before a notary public and sworn to.

We here at the National Powder Co. are carrying out sizable government contracts, and our application blanks require only name, address, age, marriage status, number of dependents, education, and a record of previous jobs. No more information is needed, and no employer is justified in asking for more.

JOHN J. CRUMBAUGH
General Manager National Powder Co., Inc.

EDITORIALS

VOLUME 132 NUMBER 2

January 13, 1944

Defender Needed

CAN IT BE that there is no such thing as a good specification? Even more to the point, are there no specification writers who think their specifications are good? Such questioning arises from the fact that not within living memory has an article on specifications been written by other than a critic of things as they are. Specifications are "verbose", "ambiguous", "contradictory", "too full of instructions", and "loaded with legal legerdemain", allege the critics. To all of which the specification writers make no reply. Are they spineless, or too dignified to answer the charges? Or can it be that the charges are true, making effective reply impossible? If one may be pardoned for a poor parody on Sir Walter Scott's "Lay of the Last Minstrel", this singular situation might be portrayed thus:

Breathes there the man, with soul so dead,
Who never to himself hath said,
These specs are really, truly fine!
Whose pride hath ne'er been hurt enough
To cause him to defend his stuff
From critics, tearing line from line?
If such there breathe, go, tell him plain,
His silence brings the art no gain.

There must be some good specifications, but it is not evident from the literature on the subject. It is time for the specification writers to take pen in hand. The critics rest, but only temporarily.

No Credit to the Architects

THE RECENTLY ADOPTED engineer license law in Illinois has been declared unconstitutional in a taxpayer's action brought by a manufacturer of screens (of all people!) whose proportionate share of the cost of administering the law would be so small as to make it improbable that he would attack the law on his own initiative. The general belief among informed engineers in Illinois is that the real parties of interest aiding and abetting this action are architects who fear that the professional engineer act may interfere in some way with their practice, although the act exempts the practice of other recognized professions. This sniping at engineers by Illinois architects cannot be too strongly condemned. It brings to mind attempts of New York architects a decade or more ago to curtail the legitimate practice of engineers, which attempts were not abandoned until responsible leaders in the American Institute of Architects took the matter in hand to protect the good name of their profession. The Institute should also look into the Illinois situation. If architects there have a legitimate objection to the engineer license law, let them discuss it in open meeting with the engineers; if they have not, then the Institute should put an end to the current attacks.

Advance Provision for Sluicing

A VALUABLE WARNING for those who plan to construct flood control works in locations where there may later be need for sluicing out materials deposited in reservoirs is written plainly in the experience of the Los Angeles County Flood Control District at Santa Anita Dam. Here, not so long after the dam was built, provision for sluicing out debris is being made at much greater cost than would have been involved if a conduit had been built into the dam. Outlets designed for other purposes will not do for sluicing. Gradient, location, cross-section and freedom from obstructions to uniform flow are conduit requirements with which there can be no compromise if successful sluicing is to be carried on. At Santa Anita the value of advance provisions for sluicing was discovered too late to avoid the extra expense. But proper appraisal of the value of such provision will not be overlooked by those who read, in this issue, Mr. Baumann's informative outline of the fundamentals involved.

Contracting Loses a Leader

THE PASSING OF W. A. ROGERS last week further depletes that fast-dwindling group of stalwart, rugged contractors who expanded the railway, industrial and utility empires during the early days of the century. Their names—Rogers, Foley, Winston, Guthrie, McGovern, Ferguson, Welch, Ellison, Dravo, to mention just a few—stand out in construction history. Their word was as good as their bond. They often operated with nothing more than a gentlemen's agreement in lieu of a formal contract. Mr. Rogers often told the story of how, in his early contracting days, he undertook a big project on the basis of a few agreed prices he and the engineer scribbled on the backs of a couple of envelopes. When the first estimate was due, the engineer asked to borrow Mr. Rogers' copy of

e prices, as he had lost his own. What a tribute the integrity of a contractor! Throughout his ontracting career, Mr. Rogers practiced the princiles of "skill, integrity and responsibility," adopted s the motto of the Associated General Contractors f America, which he helped to organize in 1918. lways an ardent church member, he led a full hristian life in a rough, tough industry that was requently regarded with suspicion by the general ublic. His words to a young engineer he had just ired reveal his character: "Remember, we haven't emained in business all these years by doing oddy work." Construction will miss W. A. ogers, just as it misses all the rest of those grand d patriarchs who have passed on.

rial by Jury

HE "TRIAL BY JURY" procedure adopted by the attle water department in connection with the roposed design for a new type of water main is timulating adventure in postwar planning. W. C. orse, superintendent of the department and the iginator of the design, had some ideas for the nstruction of big pipe that would serve for a inimum of 100 years. Was the design practical? ould it be improved? He sought the answers to se questions from sources representing many ewpoints—a manufacturer, a research expert, a ief engineer, a superintendent and waterworks erator. Each, according to his special experice and knowledge, furnished criticisms. Whether not these suggestions lead to complete abandonnt of the design or cause revamping to overcome rtain faults, the ultimate result will be to Seattle's nefit. All of this points to one of the major vantages of getting postwar planning underway w, when there is still time to experiment, delibte and otherwise take advantage of trial by jury.

New Responsibility for Engineers

ERE CAN BE NO DOUBT NOW that the "prudentvestment" theory of utility valuation is here to y, and that the "fair-value" theory that has conlled valuation for the past 40 years is on the way . The U. S. Supreme Court's decision of last ek in the Hope Natural Gas Co. case (*ENR* Jan. p. 1) eliminated any uncertainty on this point t was left by its decision of last March in the Natural Gas Pipe Line case (*ENR* March 26, 1942, p. 488).

Just what effect this latest decision will have on engineers who have specialized in valuation is not yet clear, but it seems to indicate that there will be less of such work in the future. This much, however, is clear: The court's acceptance of the prudent-investment theory has placed a new responsibility on engineers who build power plants and other physical properties for public utilities. Hereafter, they must get on record such complete information concerning their expenditures as to make them beyond challenge when utility commissions come to review the utility's investments in its properties in future years. Only by so doing will the engineers discharge their full responsibility.

As a matter of history, it is of interest to recall that it was the reformers of the Nineties who introduced the theory that the reformers of today have forced into discard. In those days when prices were declining, they saw in the reproduction-cost-new theory an opportunity to cut the value of utility properties and thus gain their objective of lower rates for the consumer. Now, a half century later, prices are rising, and the reproduction-new theory is no longer attractive to them.

Against such historical background, it is difficult to be too dogmatic either in condemning or endorsing what the Supreme Court has done today. It must be recognized, however, that the old "fair-value" method of evaluating a utility's property for rate making purposes had become hopelessly complicated, and had involved both the utilities and the commissions in vast expenditures, in determining "original cost" and "cost of reproduction new"; moreover, if a commission failed to consider any one of the several elements of value that the Supreme Court in 1898 said must be considered, the whole case could be thrown out of court, requiring a new start. Much of this expenditure could not easily be justified. And even if it provided engineers—along with lawyers—with many lucrative jobs, the work was the antithesis of true engineering.

Under the "prudent investment" theory the volume of valuation work will no doubt decline, yet that which remains will require the best of engineering judgment and brains. The Supreme Court's latest decision is therefore not devoid of favorable implications.

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Construction

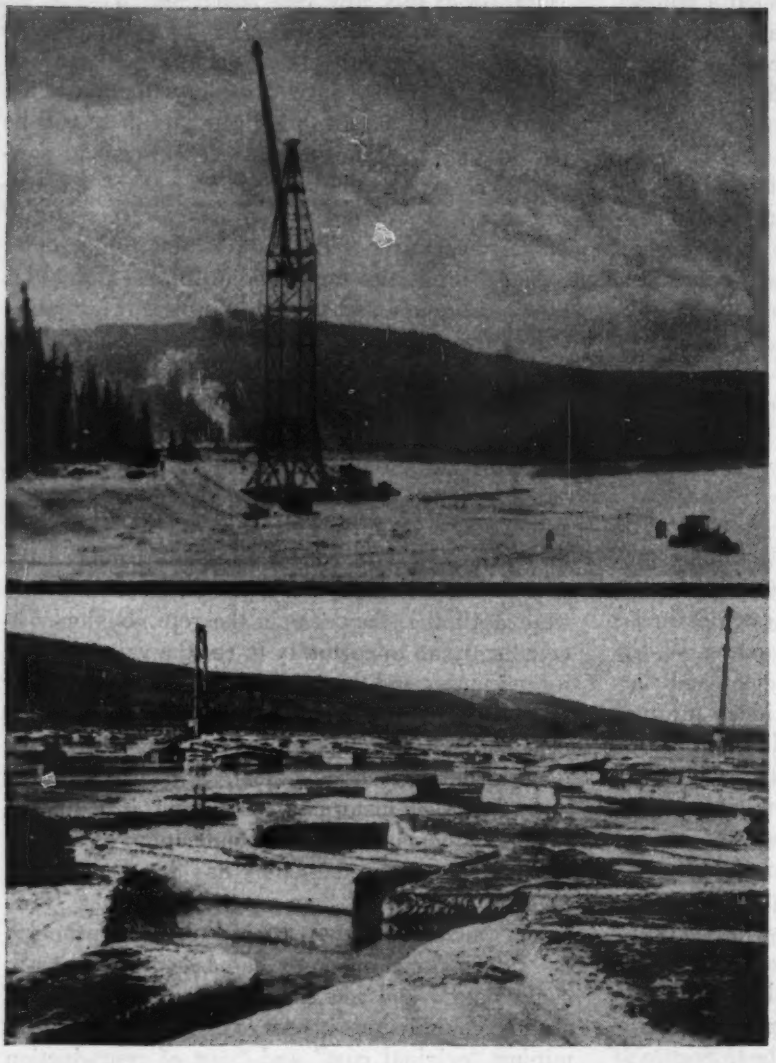


Fig. 1. Two important stages in the construction history of the Peace River Bridge. (Top) Derrick rig on river ice ready to begin tower erection. (Bottom) Ice breaks up just as towers are finished.

***Contents in Brief**—The Peace River crossing of the Alaska Highway, a 930-ft. span suspension bridge, was completed between February and August. River ice supported derrick for tower erection, but cables and suspended structure were placed by aerial methods. Open-type strand cables are largest of this type. Bridge provides a 24-ft. roadway.*

THE SENSE OF URGENCY surrounding every undertaking on the Alaska Highway seems to inspire men to achievements previously considered impossible. There can be no other explanation of the incredible fact that traffic was moving over the 2,130-ft. Peace River Bridge eight months after the contractors were given notice to proceed.

In that period all parts of the structure were detailed, manufactured, shipped 3,000 miles to the site and erected. The entire superstructure was built in 18 weeks, and the bridge was ready for traffic 9 weeks after the first main cable strand was set in place.

The Peace River Bridge is the largest river crossing on the highway. Of suspension type, it has a 930-ft. main span and accommodates a 24-ft. roadway. All principal dimensions are shown in Fig. 3.

Simplicity and orthodoxy were the keynotes of the design, and every attempt was made to reduce the amount of detailing and fabrication to a minimum. All members of the 13-ft. deep stiffening trusses are plain rolled sections, as are all floorbeams, stringers and diagonal bracing. The main tower legs consist of 36-in. wide-flange rolled sections with cover plates, and the tower diagonals are of channel and cover plate design.

To avoid placing additional load on the already overtaxed steel castings industry, an attempt was made to use plates, slabs, rolled sections and wire for the entire structure.

The success of this program is attested by the fact that the structure required the manufacture of only four small steel castings—the two expansion rockers under the river end of each approach span. The main cable sockets are steel castings, but they were providentially on hand in the contractor's bridge equipment stock. The suspender sockets are a new war-born type of forged socket requiring only a comparatively small amount of steel, labor and machine time.

The main cables are of parallel strand "open-type" construction. Each cable consists of twenty-four 1¼-in. dia. galvanized bridge strands arranged in the form of a rectangle, 6 high and 4 wide. The strands are spaced 3¼ in. center to center vertically and 4¼ in. horizontally. They are noteworthy as the largest cables of the open-type construction. Having a gross area per cable of 51.91 sq. in., their size may be judged by comparison with the Deer Isle Bridge, which has a main span of 1,080 ft. and an area per cable of 25.6 sq. in.; the Davenport Bridge, with a main span of 740 ft. and an area per cable of 45.65 sq. in.; and the Maysville Bridge, with a main span of 1,060 ft. and an area per cable of 83.7 sq. in.

An unavoidable increase in detailing work was occasioned by the fact that, in order to keep river bank cuts and fills within reasonable proportions, it was necessary to place the bridge on a grade. This added to the frenzy of the detailers and the cable

Record Set on Alcan Suspension Bridge

Blair Birdsall

Assistant Chief Engineer, Bridge Department
John A. Roebling's Sons Co.
Trenton, N. J.

calculators; but, in view of the record made, it is doubtful that the overall time consumed could have been any less with a symmetrical structure.

The superstructure contractor received verbal notice to proceed with the work on Nov. 23, 1942. By Dec. 1, orders for the main tower steel and cable wire had been placed with the mills, and on Dec. 28, 1942 the first carload of permanent material, containing embedded anchorage steel, was shipped. By April 17, 1943 detailing, ordering and manufacturing of all parts of the structure and all erection equipment had been completed, and the last of more than 100 cars was shipped on that date.

Erection of the substructure began in early December. Field work on the superstructure contract got under way when the first eight men reached the site at the end of January, 1943. The first problem was that of providing the basic necessities of food and lodging, and, considering the fact that the nearest rail station was 40 miles away and the nearest source of food supply 500 miles, the prospect was not bright. That these conditions were overcome in short order is attested by the fact that on Feb. 15 a well-furnished camp was caring for the needs of 72 men, and two weeks later, 171 men were being housed and fed in comparative comfort.

Construction workers do everything

During this period bridge construction workers were doing everything but build a bridge—they were acting as ditchdiggers, pipe fitters, masons, messengers and truck drivers. Some were pressed into service on the substructure work, driving piles, building forms and pouring concrete, helping the foundation contractor in his race against time to complete the piers before the river ice went out. The success of the whole program was due in no small part to the willingness of these men, who were nearly all highly skilled bridgemen and carpenters, to turn their hand to any work that had to be done.

Provision had been made to erect the towers under any condition of river or weather. However, the most rapid scheme required the presence of the river ice. Previous history indicated that the ice would be unsafe after March 15 and would go out about April 1. Thus, every effort was made to have the piers ready at the earliest possible moment. It turned out that the river ice remained intact just long enough to erect the towers.

A 250-ft. high tower erection derrick rigged with a 130-ft. boom was constructed on the ice upstream from the south tower; 20 ft. x 20 ft. in cross section and weighing approximately

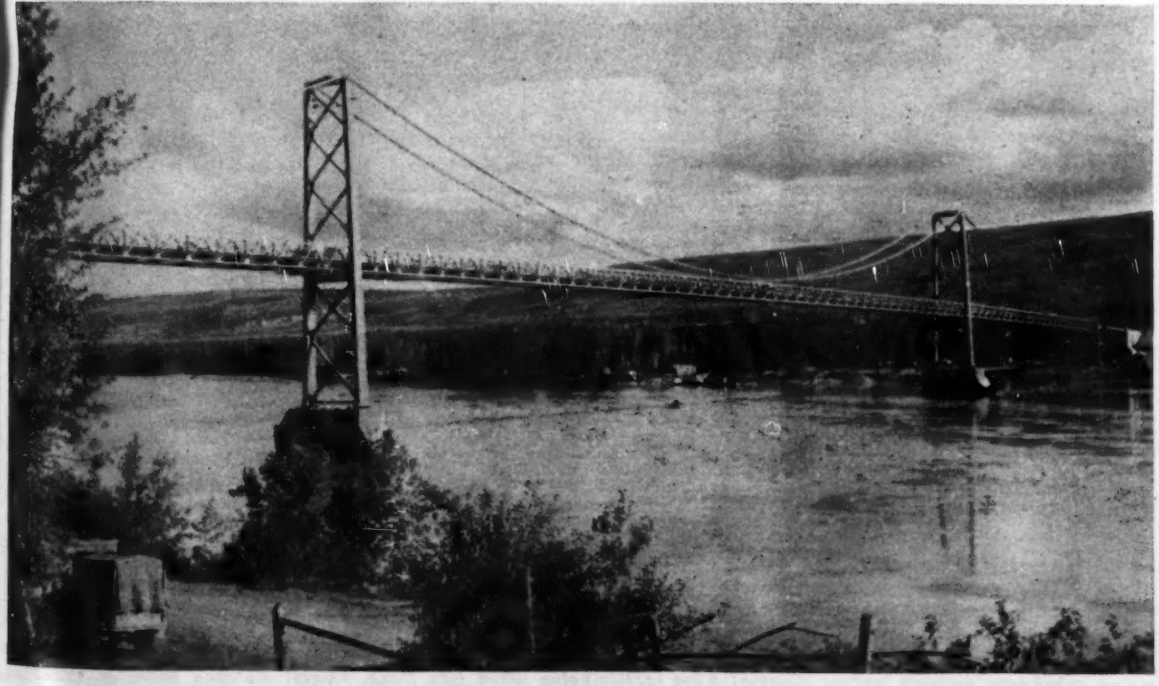


Fig. 2. The 930-ft. span suspension bridge, which carries the Alaska Highway across the Peace River in British Columbia.

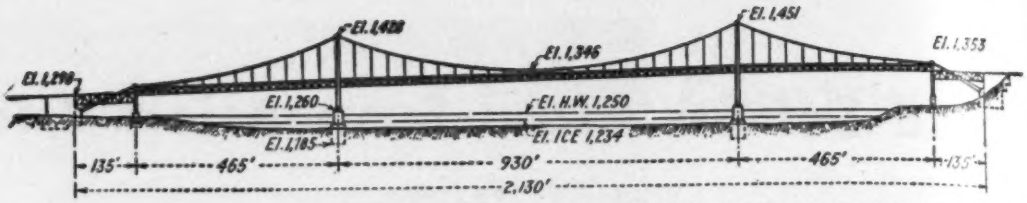
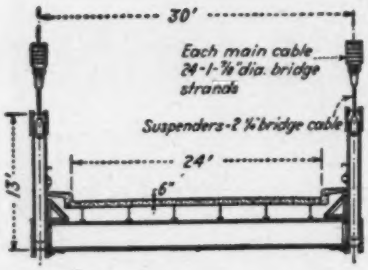


Fig. 3. Symmetry of span layout and simplicity of structural makeup are important characteristics of the Peace River Bridge.



100 tons, it was set on a skid frame that distributed the derrick load over an area 50 ft. x 50 ft. The 50 ft. 36-in. H-section skids were veterans of the New York World's Fair.

Hoists and wire rope tackle anchored to dead men set in the ice were used to move the derrick. Four gasoline hoists and one steam hoist exerting a total pull of approximately 50 tons were required to break the derrick loose from its erected position, but only about 20 tons were required to move it thereafter.

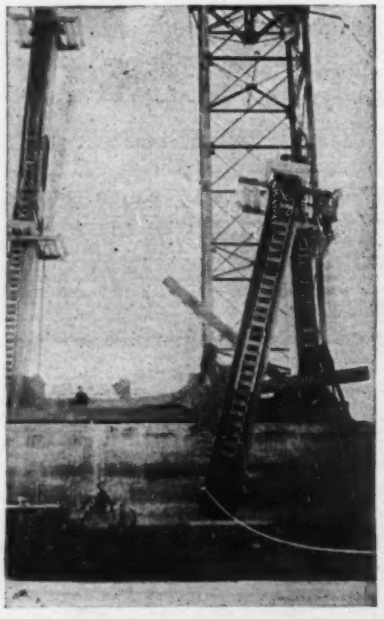
Skidding the tower across the river from one pier to the other was accomplished without difficulty, although many ice cracks developed in a wide ring about the derrick base. Test borings taken at intervals of approximately 65 ft. on a line about 200 ft. upstream from the bridge revealed the following ice and water depths:

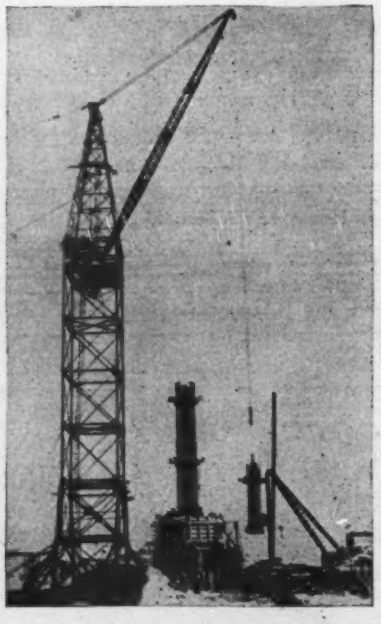
Ice Thickness In.		Depth of Water Below Ice In.
39	*Station of south pier*	0
53		0
34		10
38		24
33		48
32		58
39		52
37		58
33		67
37		68
37		55
43		63
37		62
52		52
54	*Station of north pier*	47

The substructure contractor's trestle piles on the river side of each pier were cut off at ice level and capped with heavy timbers. These piles formed a solid support for the hoisting load toe pressures of the tower derrick. Since the derrick boom was not equipped with swinging gear, it was necessary to skid it backward and forward from one tower leg to the other. To facilitate this movement, waxed T.&G. flooring was laid at the location of the derrick skids and, to provide smooth operation, two opposing sets of twelve-part falls were used.

To insure against the possibility of the derrick overturning under the most unfavorable loading conditions, a back guy was installed from the top of the mast to a variable counterweight at the far tower pier.

Before erection each tower leg section was completely equipped with rivet scaffolds and access ladders. The center of gravity had been marked on each section in the shop, and special lifting links had been provided to make sure that each section of the battered tower legs would have its proper alignment while hanging in the derrick falls.





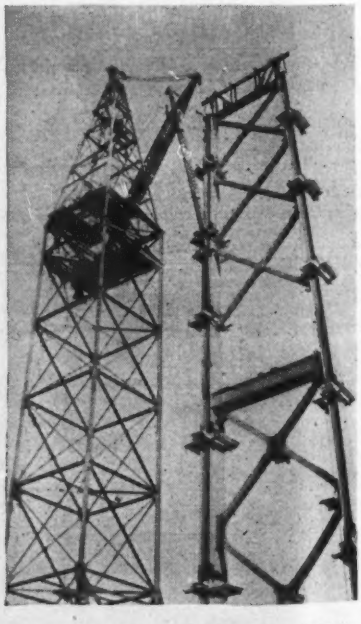


Fig. 4. Typical steps in tower erection (Left) Leg section equipped with construction ladder and riveting scaffold being up-ended from delivery trailer. (Center) A leg section being lifted into place. (Right) Chicago boom on tower was used to dismantle erection derrick when its work was completed.

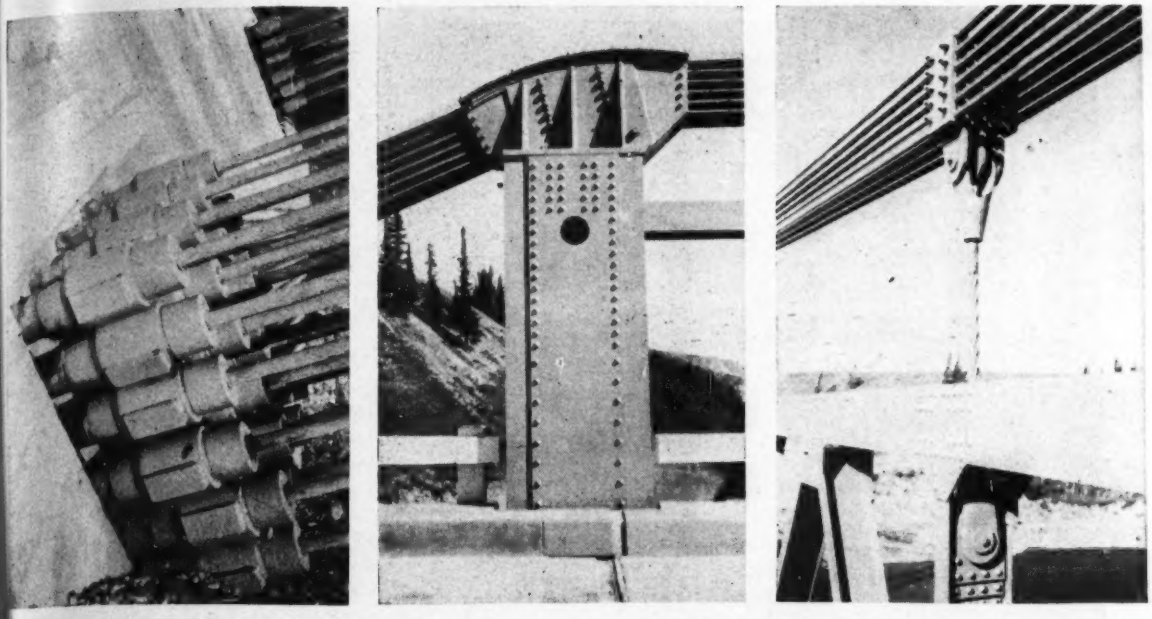


Fig. 5. Cable details emphasize the simplicity of the Peace River Bridge design. Left to right: anchor sockets, cable bent and suspender connections.

The sections, which ranged in weight from 15 to 28 tons, were delivered to the site on low-bed trailers. Each load was spotted so that the upper end of the section as it lay on the trailer was directly below the derrick boom tip. As the derrick falls began to up-end the load, the trailer moved back slowly so that the load was picked clear without the sliding or swinging, which would have occurred had the falls been allowed to reel while picking up the load.

The south pier was turned over to the superstructure contractor on the evening of March 27. The first tower section was set at 8:30 p.m. that day and the last south tower member was set at 11:15 a.m. March 31.

The derrick was moved across the river on March 31 and on April 2 the job diary carries the following statement: "Rained last night. Warm all day today and water everywhere from melting snow. Top of ice on river becoming soft." The first north tower sections were set the morning of April 2, and despite 1½ days lost time due to delay in receiving steel the tower was topped out at 4:40 p.m. April 5; 700 tons of steel in two towers 930 ft. apart, and rising to a maximum height of 190 ft., had been set in 9 days elapsed time and 6 days of actual erection time.

On April 10 it was necessary to stop truck traffic across the ice, and on April 16 the temporary trestle was destroyed. The river ice was on the move through the period from April 10 to April 26, when ferries were placed in operation. The wooden trestle was rebuilt and opened to the vital highway traffic on May 12, only to be destroyed again by high water and driftwood on May 22. However, that ten-day interval was sufficient to allow transportation of the remainder of the bridge steel for the north side.

Cable erection procedure

During the period between completion of main towers and completion of concrete cable anchorages, the cable bents and approach spans were erected. By May 23 the anchorages had progressed to such a point that aerial equipment could be installed.

Four 1¾-in. dia. wire ropes were strung from anchor to anchor over the tops of towers and cable bents, two adjacent to each main cable saddle. These ropes were used to deflect the main towers back to their free cable positions and were later used in truss erection.

An endless 1-in. dia. hauling rope was installed from anchor to anchor, resting on rollers at all cable support points. One part of the rope was set adjacent to each main cable. The first main cable strand was hauled across on May 30. As soon as the eight strands forming the bottom row of both main cables were installed, one strand in each cable was adjusted by instrument. All other strands in both cables were adjusted by comparison with these "guide strands" by means of measurements taken from access cars riding on the high lines. The last strands were installed on June 7. The erection of cable bands and suspenders was completed on June 16.

Generally speaking, the methods used in suspended steel erection were as follows. For the side spans, complete 40-ft. sections of trusses and floor steel weighing about 34 tons were assembled on the ground at the shore end of the spans, hoisted by means of a car riding on the high line cables, and trolleyed to position. Main span steel was erected by means of a wooden stiff-leg traveller mounted on the top chord of the stiffening truss, which raised individual pieces of trusses and floor steel from a barge on the river. There were some deviations from this scheme, which will be noted below.

First to be erected were the side span panels adjacent to both towers. Next, complete trusses, which had been assembled on the ground at the shore ends of the side spans, and individual floor system pieces for the main span panels adjacent to the towers were trolleyed to the towers and "telegraphed" through the tower

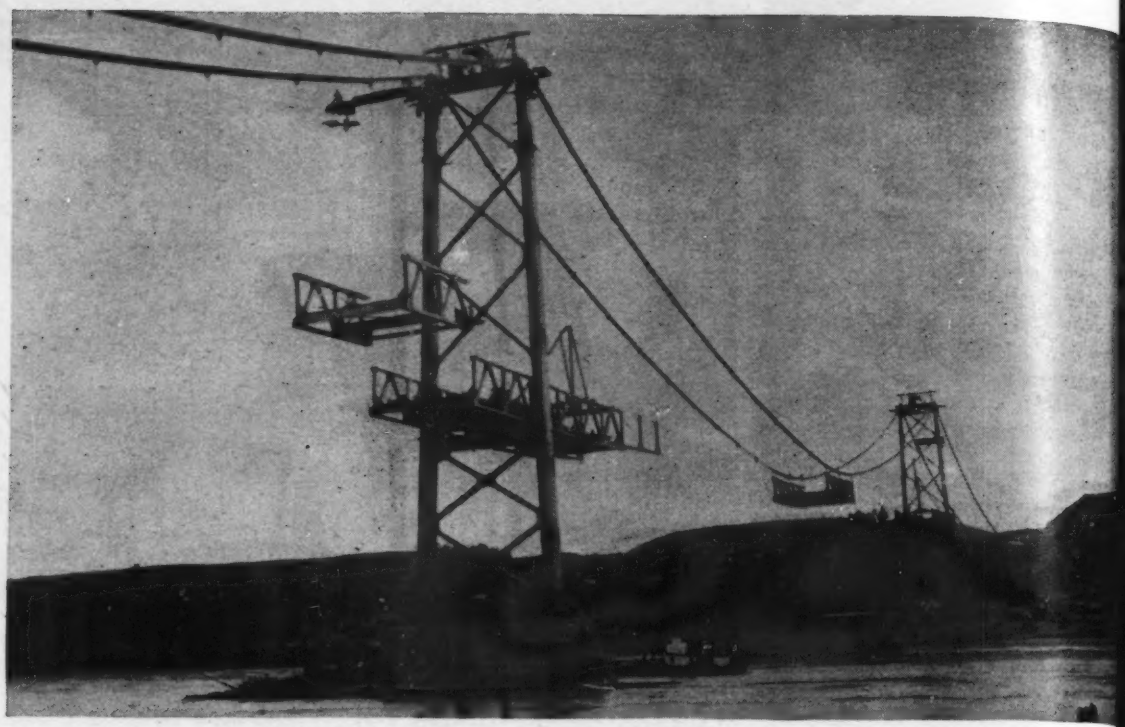


Fig. 6. With two panels of deck steel hung at the center of the main span as a counterweight to hold the cables clos their final curve, deck installation proceeds either way from the towers. Side span panels were brought out from shore high-line car, while those in main span were lifted from barges by stiffleg travelers riding on the erected top chords.

portals to position by means of the high line cars. In the same manner the parts for the two panels at mid-main span were brought to the main span sides of the towers. They were then trolleyed out to position by means of the main span high line car.

From this point on, erection proceeded according to the general scheme outlined above. The heavy concentration of two complete panels at mid-main span reduced the severe reverse curve, which is a usual characteristic of a suspension bridge truss during erection, and greatly facilitated the "making" of the truss connections and splices.

There was no time for the usual elaborate truss erection computations or model studies in order to set a definite program for field erection. Thus, it was necessary for the field to use the bridge as a full-sized m to control the delicate balance of span and main span operations working out the details of the of the erection of the various pa step by step as the job progressed plan was devised which require minimum of computation com with continuous field observation.

Two basic criteria were used: The maximum allowable tower deflection to keep from overstres tower material or anchor bolts: (2) the maximum allowable rati unbalance in cable tension to tot at the tower tops to keep the c from slipping in their saddles.

Erection of suspended steel be on June 21 and was completed July 13. In one day, July 5, se complete panels were assembled erected, a total of 280 lin. ft. and tons. All riveting was completed August 2.

After the rapid installation forms (which had been prefabric at the camp site) and reinfor bars, the concrete roadway poured with the aid of a nar gauge industrial railway. Pourin suspended roadway concrete be on July 28 and the roadway, 1

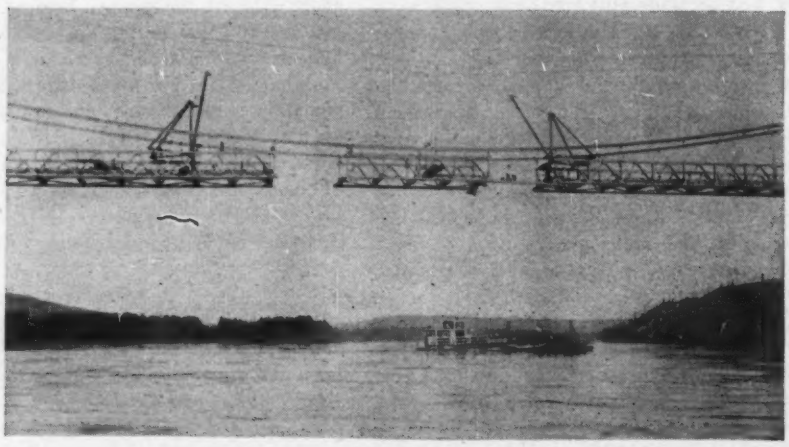


Fig. 7. Main span deck steel approaching closure. All suspended steel was placed between June 21 and July 13, the greatest single day's accomplishment being the erection of seven complete panels.

ft. long and 24 ft. wide, was completed in three days pouring. The bridge was opened to limited military traffic on August 4.

During August, the concrete curbs were installed, all forms were removed, handrailings were placed, the bridge was painted and all clean-up work was completed. The structure was entirely complete and ready for the official opening ceremonies on Aug. 30.

At the outset a construction schedule was set up which appeared just short of impossible. It was intended as a goal for all parties concerned, with a faint hope that it might be accomplished. Both scheduled and actual times are shown in the accompanying table.

The hope that the schedule might be accomplished was based on the expectancy that all tower, cable and truss erection operations would be carried on with the assistance of the river ice and on the fact that a temporary timber floor was to be placed instead of a concrete floor. As it turned out, unavoidable delays in the substructure work made it necessary to erect aerially all portions of the structure except the towers. Furthermore, orders came through to install the permanent concrete deck instead of a prefabricated, easily assembled timber floor.

The long period between completion of towers and completion of cables was occasioned by unavoidable delays in the substructure work. It may be noted that, from the time the bridge was ready for the cables, the remainder of the structure with concrete roadway was completed by aerial methods in a period of 73 days, just seven days longer than called for in a schedule that was considered nearly impossible on the basis of ice-supported work and a timber roadway.

The total time required for erection of the superstructure was this 73 days plus the 5 days required for tower erection, or 78 days, just two days longer than schedule. Those who question the near impossibility of the original schedule may refer to Fig. 8, which presents a chart comparing actual performance on the Peace River Bridge with that on a similar bridge constructed in normal times within easy reach of sources of supply.

The record made on the Peace River Bridge could not have been accomplished by any one group of men or any one organization. It was made possible by the close cooperation between the Public Roads Administration, the U. S. Engineer Corps, the contractor, the material subcontractors and suppliers, the railroads, and all workmen both in shop and field.

Somehow the construction of this large structure out in the wilderness on an important military highway caught the imagination of every man remotely connected with it, and inspired him to exceptional accomplishment. Bridge workers, who normally look with disdain on any type of work outside of their own specialty, willingly turned their hands to whatever job was at hand. Practically all the reinforcing work, concrete work and painting, and much of the camp construction were done by men who had never before touched a shovel, a brush, or a reinforcing rod, and it is doubtful if the masters at the trades could have done as well.

The Peace River Bridge was designed by and built under the supervision of the Public Roads Administration of the Federal Works Agency. The substructure was furnished and installed by the Dufferin Paving Co., Toronto, Canada. The superstructure was furnished and erected by the John A. Roebling's Sons Co., Trenton, New Jersey. The principal material subcontractors were the Bethlehem Steel Co., Bethlehem, Pa., which furnished the main towers and cable bents, and the Belmont Iron Works, Philadelphia, Pa., which furnished the roadway steel.

Joseph S. Bright as district engineer for the Alaska Highway District was in charge of the work for Commissioner Thomas H. MacDonald of the Public Roads Administration. He was represented as to design by Raymond Archibald, principal structural engineer, and in the field by R. R. Tipton, senior structural engineer, and C. J. Carrigan, resident engineer. In the field for the John A. Roebling's Sons Co., were W. R. Voght, general superintendent, and H. W. Hills, resident engineer

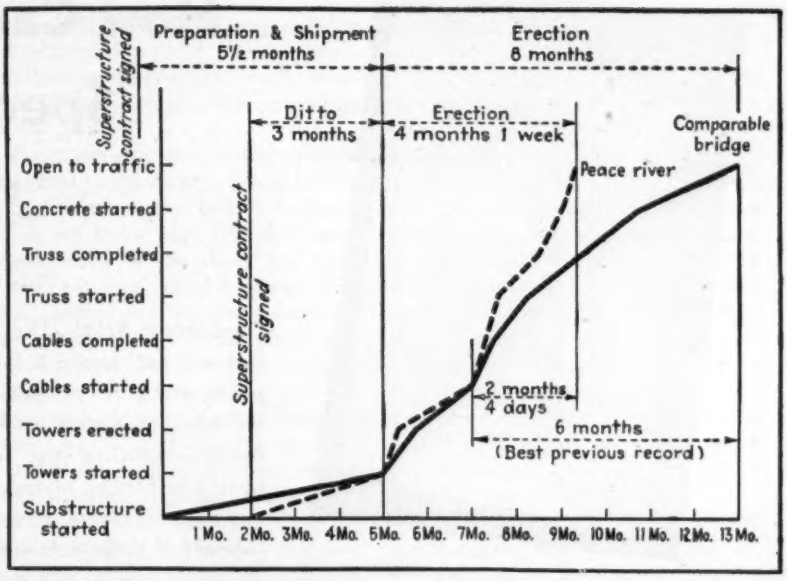
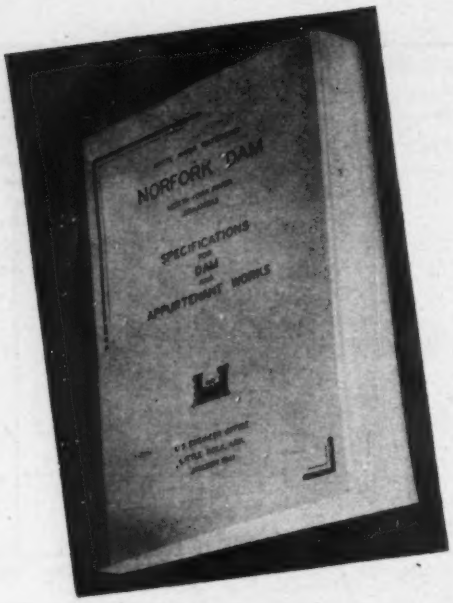


Fig. 8. Why the Peace River job is called a record. This graph compares its progress with an almost identical bridge built by the same contractor in the Middle West in peacetime. Despite severe weather actual field erection of the Peace River Bridge went ahead about twice as fast.

HOW SCHEDULED AND ACTUAL TIMES COMPARED ON PEACE RIVER BRIDGE

	Days After Completion of Last Pier		Days After Bridge Was Ready for Cables	
	Schedule	Actual	Schedule	Actual
Both towers complete	10	5	..	..
Cables completed	24	68	14	15
Suspended steel erected	46	104	36	51
Bridge with wood floor, ready for traffic	76	126	66	73



How Can We Improve Specifications?

D. V. Purington
Civil Engineer, Austin, Texas

***Contents in Brief**—The engineer who wants to write a specification that will not require a lawyer's interpretation must strive for simplicity and brevity. Hints are given for better specification writing, which will ultimately lead to more efficient construction procedure. Points emphasized are: Segregation of instruction from specifications; clarification of specifications; use of a non-itemized, all-inclusive payment clause instead of a detailed listing of items; and establishment of definite tolerances to guide the engineer.*

THEORETICALLY, a specification is a written description of a particular item of work, or a particular material, which sets forth the characteristics and qualities that are required to satisfy certain conditions. Actually, most of today's engineering and architectural specifications are an engineer's dream, a contractor's nightmare and a material man's dilemma.

Our specifications are cluttered with verbiage and filled with instructions that have no place in a specification. The result is confusing to the contractor, bewildering to the building owners, inscrutable to the inspectors and loved by the lawyers. Specification writers seem to have forgotten the fact that simplicity encourages understanding.

Specifications are not instructions. When a specification includes detailed descriptions of the construction or manufacturing processes, and proceeds to tell how each operation must be performed and what tools must be used to perform it, it ceases to be a specification and becomes an instruction. Use of instructions for specifications takes away the contractor's opportunity to use his own skill and ingenuity in developing new methods of construction or reducing costs. It also invalidates that portion of the contract which is supposed to place the sole responsibility for the satisfactory performance and completion of the work on the contractor. This practice of telling the contractor just how he must perform each operation, and then insisting that he be responsible for the character and quality of the work, has put many an engineer and architect in an embarrassing situation, especially before a court of law.

Specification analysis

For a random example, let's look at the "Recommended Standard Specifications for Concrete" presented by the Joint Committee and published by the American Society of Civil Engineers. In Section 407-S—General, subparagraph (a), there are twenty-two words used to say that the concreting equipment shall be clean. Who said that engineers were men of few words?

In subparagraph (b) of the same section, it says: "Before depositing concrete, debris shall be removed from the space to be occupied by the concrete;". We know that the authors intended to specify that the space to be occupied by the concrete (presumably the forms) shall be clean. "Debris" as defined in Webster's "Home and Office Dictionary' is" ruins or fragments of rock and other substances, piled up in confusion, as the wreck of some wasteful forces or disaster." Some form builders are wasteful forces, we admit, and what about nails, dust, mud, etc.?

In this same subparagraph, it is stated that forms, if constructed of lumber shall be wetted or oiled. What about metal forms? Once upon a time, it was held that dry forms drew the water out of fresh concrete, and that this resulted in damage to the concrete surface. More recently it has been proved that form lining having absorptive qualities is desirable. The reason for wetting or oiling the forms is somewhat obscure. We know that dry forms are apto stick to the surface of the concrete and leave an undesired surface, but this can be corrected by finishing, if the contractor is careless. We also know that dry forms are difficult to remove, and are often torn up in the process. It is better and cheaper for the contractor who is reusing the forms to take care to preserve them intact as far as possible—but why put that in the specifications?

The standard specifications of state highway departments, approved by the Public Roads Administration, and the specifications of other government agencies, contain even greater violations of the rules of simplicity, and include even more detailed instructions.

Provisions for payment

When it comes to writing the provisions for payment, someone has apparently scared the specification writers into dizzy tailspins. The following paragraph is a typical example from state highway department specifications:

> *Payment.* The work performed and materials furnished as prescribed by this item as measured as provided under "Measurement" shall be paid for at the unit price bid for "Portland-cement concrete base" or "High-early-strength concrete base" as required, which price shall be full compensation for shaping and fine grading the roadbed, including furnishing and ap-

plying all water required; for furnishing, loading and unloading, storing, hauling and handling all concrete ingredients, including all freight and royalty involved; for mixing, placing, curing and finishing all concrete; for furnishing and placing the longitudinal parting strips; coating steel; for furnishing all materials and constructing all expansion, construction and contraction or dummy joints; and for all manipulation, labor, equipment, appliances, tools and incidentals necessary to complete the work.

The writer of this paragraph was attempting to describe therein *all* of the items which would be included in the item of work. This item of work is described in the opening paragraph of the specification as:

> Portland-cement concrete base, constructed as herein described in one course, in conformity with the typical sections shown on the plans, and to the lines and grades established by the engineer.

Unfortunately, the specification writer *failed* to mention the furnishing and setting of the forms, leaving a gap in the detailed description that makes his efforts practically null and void.

This payment paragraph could have been written:

> *Payment.* Portland-cement-concrete base or high-early strength concrete base, constructed as herein described, in one course and in conformity with the typical sections shown on the plans and the lines and grades established by the engineer, completed in place, will be paid for at the unit price bid.

Tolerances

Records of completed projects indicate that a considerable number fail to agree with the original plans and specifications. In many instances this is not the fault of the constructor or the inspector, but the fault of the designers and specification writers. The stock phrase "the work shall be constructed to the lines and grades established by the engineer and in accordance with these specifications" is very easy to write, and it is all-inclusive. It is also quite definite. In fact, it is too definite for ordinary construction methods. We usually construct in a hurry; as a result, walls, floors, curbs, columns and other surfaces seldom conform exactly to the lines and grades established or shown on the plans. The acceptable construction is close—close enough. When the job is finished, it looks good and satisfies the purpose for which it is intended, but there are few tolerances ever mentioned in the specifications or shown on the plans.

Designers and specification writers are prone to ignore such things, either because they do not believe in them, or do not know what they are. As a result, many an inspector has been classed as a member of the distaff side of the canine family when he insisted on compliance with the plans and specifications. The absence of defined tolerances in specifications and on plans may result in as many different opinions as to what constitutes a completed work as there are men on the job. A single engineer, making inspections for final acceptance, can go back over a job at different times and find new changes and adjustments that should be made because there are no established tolerances to guide his acceptance. The angle of the sun with the horizon and the state of an engineer's digestion can create a lot of grief for a contractor.

Work to be done

Both engineers and architects can improve conditions in the construction field by giving some thought to the establishment of proper tolerances for the various structure units and the materials that are used. The average owner does not have the ability to visualize what kind of a structure he is going to get when he reads a specification that gives instructions for the building, but does not give a description of the completed work. Engineers have always been concerned, in normal times, with the crowding of their fields of endeavor, and are forever griping at the ineptitude of the contractors. If we will desist from telling the contractor exactly how he must do the work in the specifications and get away from the favorite specification of the archtiects—"The contractor shall drive nails as directed by the architect"—the contractors will automatically expand the field for the employment of engineers. There are plenty of engineers who now work for contractors, and many more who would enjoy doing so, if the designing engineers and architects would allow contractors some responsibility on the job.

By removing instructions from the specifications and setting them up, where necessary, as separate from the contract, we can give contractors a chance to develop their own engineering skill, reduce the cost of construction and improve contractual relations materially. We can also reduce the tendency to use inexperienced help as inspectors, where thoroughly experienced men should be requird.

By applying the rules of good writing to specifications, we can improve the understanding of construction problems, eliminate arguments and save many hours in the course of preparation of plans and specifications. Personally, the writer feels that engineers should be able to write their own specifications in a manner that does not require a lawyer to interpret them in case of argument.

Inter-American Standards in Brazil

Brazil is making rapid progress in establishing standards for electrical installations, metals, pipes, coal and many other materials. The country is thus taking active part in the Inter-American program for drawing up standards which will facilitate use by hemisphere countries of industrial and consumer goods manufactured by neighboring republics.

The standardization movement has grown in Brazil and now is centered in the Associacao Brasileira de Normas Tecnicas (Brazilian Association of Standards). The findings of this association have been given official status. Membership at the beginning of 1943 included 150 corporate members, 100 official institutions and 550 individuals.

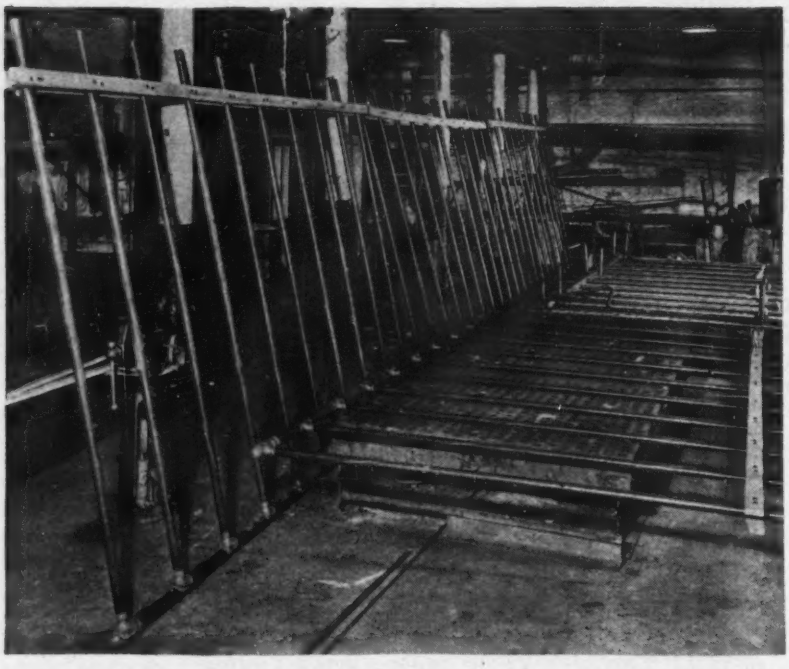
The association cooperates with similar organizations in other South American republics and with the Inter-American Departments of the American Standards Association.

An important task is the translation of United States standards and other standardization documents into Spanish and Portuguese for distribution in the countries to the South.

The association has developed special standards to guide the federal government and several of the states in purchasing. It was requested to draw up emergency standards to aid Brazil in its war effort.

Heat Losses of Underfloor Grids Reduced by Low-Cost Insulation

INCREASING APPLICATION of radiant heating to industrial structures is now being made and it appears probable that this method of heating will be used quite extensively after the war. Consequently, installations being made today are of interest as indicative of the type of floor construction that may be called for in this kind of work in the postwar period. One such installation was described in *ENR* Oct. 21, 1943, p. 620. In another eastern war plant a somewhat different method of floor construction was used and it is expected that this will materially reduce heat losses into the ground.



In constructing the heating grids, 8-ft. lengths of 1¼-in. dia. wrought-iron pipe were welded to the 2-in. wrought-iron manifold-headers on 18-in. centers.

The heating coils were laid on strips of 1-in. fiber board resting on a 6-in. crushed stone fill. They were then covered with 6 in. of plain concrete, which completed the factory floor.

Piping rest on fiber board

At this latter plant radiant heating was applied to a 60x80-ft. one-story addition without basement. The floor area was excavated to 12 in. below the finished grade level. Over this was spread a 6-in. layer of crushed stone. On this stone base the heating grids were laid, each pipe resting on an 8-in. wide strip of 1-in. thick Celotex fiber board to insulate the heating pipes from the underlying stone. After the grids had been installed and tested under pressure, the 6-in. topping of concrete was added.

Three heating grids were installed. A typical grid consisted of manifold headers of 2-in. wrought iron to which 8-ft. lengths of 1¼-in. wrought-iron pipe were shop-welded on 18-in. centers. Each grid was individually vented and carefully balanced by valving to get uniform heating. The lines were pitched to facilitate draining.

Hot water for the heating system is supplied by a boiler that heats the entire plant and office building. Water is circulated by a ⅓-hp. pump in the boiler return line, its temperature being controlled manually by the boiler-plant engineer.

Floor temperature of 75 to 85 deg.

Water for heating is supplied to the floor coils at a temperature of 110 deg. F. and it has a temperature of 90 deg. in the return line. This results in a floor temperature of from 75 to 85 deg. and an air tem-

perature within the plant of about 65 deg. Because of the expected high heat loss through the walls and roof, which have a high percentage of glass, a few supplementary thermostat-controlled unit heaters were installed near the ceiling. The floor coils have proved thoroughly adequate to carry the heating load, as is evidenced by the fact that the unit heaters have never operated.

For the radiant heating system, 2,326 ft. of wrought iron pipe was assembled in the three grids. Installation of the pipe, including fabrication of the grids, cost $1,700.

The plant was built for the Murray Corporation. Lawrence A. Menefee, of Baltimore, was architect for the work and Stockett M. Whiteley, also of Baltimore, was consulting engineer. L. R. and G. Clyde Andrews of Towson, Md., were the general contractors on the project. Heat & Power Corp., Baltimore, was the heating contractor.

Bench-marks were placed on the roof members to indicate the position of the grids so that cuts for machinery anchors would not injure the piping.

Chile Plans Long-Range Electrification Program

A nation-wide electrification program, estimated to cost $100,000,000 and to require 18 years to complete, has been projected by Chile as part of the republic's plans for development of industry, especially after the war.

The electrification program has been announced by the Development Corporation of Chile, an agency functioning somewhat along the lines of the Reconstruction Finance Corporation in this country. According to the newspaper "La Hora," of Santiago, the electrification program will be supervised by a special agency known as "Empresa Nacional de Electricidad," the equivalent in some respects of the Tennessee Valley Authority in the United States.

Like many other countries in Latin America, Chile's industrialization prospects hinge in large part upon development of fuel sources. Chile is South America's largest coal producer. But coal production just about covers domestic needs, under present operations.

Meanwhile, with an economy resting now largely upon the export of copper and nitrates to the United States, Chile is attempting to diversify production and build up home industry, utilizing her natural resources, particularly minerals.

Of these resources, one of the most valuable is Chile's hydroelectric potential, derived from many short, swift streams that plunge from high mountains to the sea. Chile's tremendous waterpower resources, considering the size of the country and population (about 5,000,000), often invoke comparison with Norway. Chile, according to "La Hora," has a hydroelectric potential of 1,300 watts per capita, against 283 in the United States and a world average of 151 watts. The 18-year program envisions electrification of Chilean railroads, industrial establishments, mines and smelters and the extension of electricity through rural cooperative societies to farms.

Chile's known coal reserves, on the other hand, are rated at only 300 tons per inhabitant against 22,300 tons in the United States and a world average of 2,500 tons. Chilean mining engineers state that nearly 10 percent of the coal mined in Chile is consumed by the mines themselves in getting the remaining 90 percent to the surface and loaded into cars. These mines are very deep and extend for miles out under the sea. By electrifying the mining operations 10 percent of the nation's coal would be saved.

Chile's agriculture has been plagued by the water problem. In the extreme south, rainfall is over 100 in. per year, and this is too much rain. In the center, the rain falls in the winter, which is the wrong time of the year. And in the north, in the region of the great Atacama desert, there is no rain at all. There is subsurface water, however, and with electric pumps this desert might be turned into a second Imperial Valley.

Chile, 2,600 mi. long and in few places more than 100 mi. wide, is ideally endowed for hydroelectric power. The Andes, forming the backbone of the country, rise to peaks over 20,000 ft. The rivers, fed by snows and glaciers, dash headlong to the sea.

The long-range program calls for the creation of hydro-generating stations in seven areas to make a network of distribution lines and substations and inter-connecting power lines tying the entire nation into one coordinated power system.

The work for the first 6-year period already is under way and calls for the establishment of power stations at Puclaro, Sotaquia, Gogoti and Guayacan, in the second geographic zone; at Sauzal, Rapel, Tumunan, Goibun and Queri, in the third zone and at Manico, Colico, Pilmaiquen, Lago Chapo and at Ralun, in the fifth geographic zone.

The sum of $35,000,000 has been allocated for the construction of the hydroelectric plant on the Rapel River. This, it is claimed, will be the largest installation of its type in South America.

The Aconcagua River system just north of Santiago will be used largely in the production of portland cement, thus saving the cost of shipping coal from the mines in the south.

The E.N.E.—Empresa Nacional de Electricidad—plans to take an active part in aiding industries, municipalities and farmer cooperatives in making the most of the electric power at their command by distributing motors, machines and irrigation pumps on long term, low-interest credits.

Bending Moments Distributed Directly By Utilizing End Rotation Constants

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Contents in Brief—*Bending moments in continuous beams can be found quickly with a minimum of moment distribution by taking full advantage of the end rotation constants instead of following the usual laborious procedure of distributing moments at a joint in proportion to the stiffness of the adjoining members. Illustrative examples show simple moment distribution for continuous beams under various loadings. Maximum and minimum moment curves also may be prepared easily, using end rotation constants in conjunction with moment distribution.*

ALTHOUGH THE METHOD of moment distribution developed by Prof. Hardy Cross has become very popular in this country for analyzing indeterminate structures, the use of the end rotation constant has been largely overlooked as few designers take full advantage of these convenient factors. The application of these constants eliminates the necessity of successively distributing and balancing in order to obtain an exact result as all unbalanced moments are distributed directly to the connecting members.

In the usual procedure, moments are distributed in proportion to the stiffness (I/L values) of the members meeting at a joint. But when the end rotation constants are used, all unbalanced moments must be distributed according to the K/c values of the connecting members, the product of the stiffness and a factor 1/c derived from changes of the end moments in a beam due entirely to rotation. It can be readily shown that the end rotation constant

$$* 1/c = \frac{1 - r_a r_b}{1 - r_b \frac{M_b}{M_a}}$$

which for the prismatic beam reduces to

$$1/c = \frac{0.75}{1 + 0.5 \frac{M_b}{M_a}}$$

where r_a and r_b are the carryover factors and M_a and M_b are the end moments in a beam due to rotation.

The 1/c values for some of the more common conditions are given in Fig. 1 while the 1/c values for a beam continuous with another beam may be selected from the chart in Fig. 2 in accordance with the stiffness ratio. These values are very helpful and will be used frequently in working with continuous members.

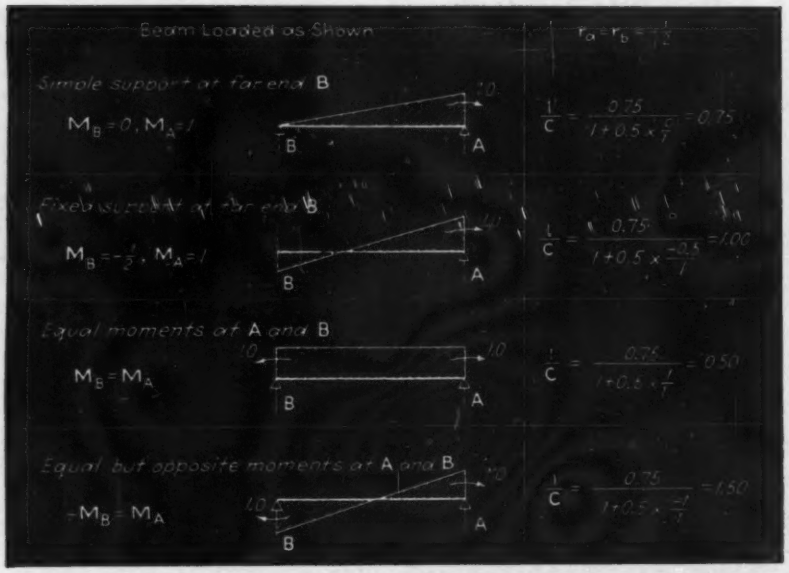
Beam Loaded as Shown
Simple support at far end B
$M_B = 0, M_A = I$
Equal moments at A and B
$M_B = M_A$
Equal but opposite moments at A and B
$-M_B = M_A$
A
B

Fig. 1. Values of the end rotation constant for prismatic beams (at end A) are shown for beams under various loadings.

As applied to a 3-span beam

The 1/c value for a continuous beam of three spans (Fig. 3) may be obtained by applying a unit moment at point A which will cause a moment of minus one-half at B if the joint at the latter point is kept from rotating. If the joint is then unlocked and allowed to rotate the moment of minus one-half will be distributed according to the K/c values of BA and BC, and

$$M_{ba} = M_{bc} = -0.5 \frac{K_2/C_2}{0.75\ K_1 + K_2/C_2}$$

and

$$1/C_1 = \frac{0.75}{1 - 0.25 \frac{K_2/C_2}{0.75\ K_1 + K_2/C_2}}$$

where k_1 and k_2 are the stiffness factors of spans 1 and 2 respectively; $1/c_1$ is the end rotation constant at A due to spans 1, 2 and 3; and 1/c

*For the derivation of the end rotation constant see page 117 of Continuous Frames of Reinforced Concrete, by Cross and Morgan.

is the end rotation constant at B due to spans 2 and 3.

The end rotation constant for the above beam arrangement may also be obtained directly from the chart in Fig. 2 by using the stiffness ratio of

$$\frac{k_2/c_2}{0.75\,k_1}$$

The end rotation constants for continuous beams of various number of spans with equal K values are listed in Table I. It should be noted that there is very little difference in the "stiffness" of two spans and three spans, and almost none between three and four spans. Neglecting the effects of all beams more remote than two spans from the support under consideration will result, in general, in an error of about one percent in the 1/c value, and consequently the distributed moment will be in error by only a fraction of this amount. Therefore it will be sufficiently accurate, for all practical purposes, to use only the two spans adjacent to the support in computing the 1/c factor.

Illustrative examples

The following examples will illustrate the use of the end rotation constants: A three-span symmetrical structure (Fig. 4a) is loaded as shown with a uniform load. The K values are as given and the end spans are simply supported at A and D. The 1/c factor for a free-ended beam, AB, is 0.75 and for a beam with equal end moments (by symmetry) BC is 0.5. The unbalanced moment of 72 foot-kips at support B is distributed according to the K/c values.

Next, using the same beam arrangement but loading only span No. 1, as shown in Fig. 4b, the 1/c value for AB remains 0.75 but for BC becomes 0.817, as obtained from the chart in Fig. 2. The fixed-end moment (F.E.M.) of 72-ft. kips then is dis-

TABLE I. VALUES OF END ROTATION CONSTANT
(For continuous beams with equal K values)

Number of Span	$r_a = r_b = -\frac{1}{C}$
2	$\frac{1}{C} = .857$
3	$\frac{1}{C} = .865$
4	$\frac{1}{C} = .866$
5	$\frac{1}{C} = .866$

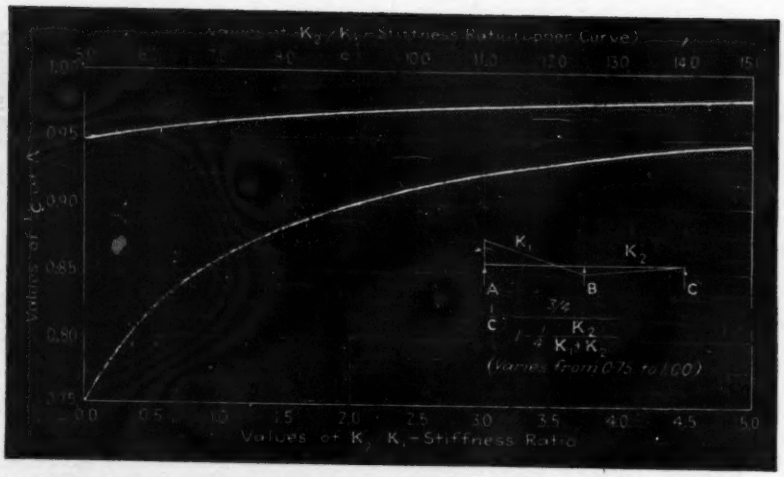

Fig. 2. End rotation constants (1/c) for a beam continuous with another beam are readily selected from this chart in accordance with the stiffness ratio of the beams.

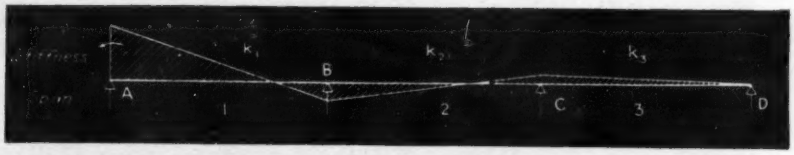

Fig. 3. For a 3-span continuous beam the end rotation constants are obtained by applying a unit moment at support A and distributing it to the other supports.

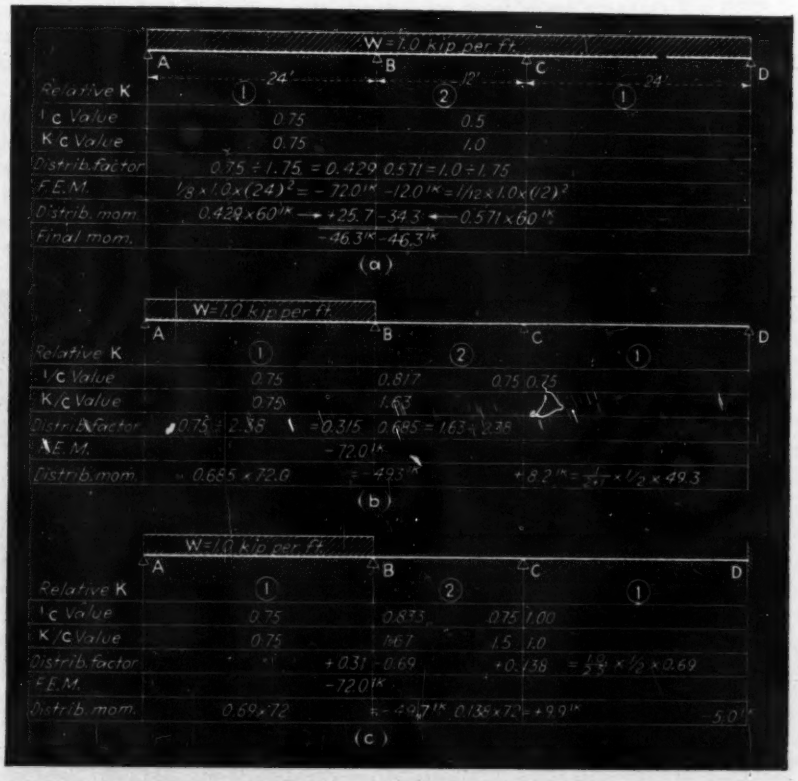

Fig. 4. Illustrative examples of moment distribution by end rotation constants are given for a 3-span continuous beam under (a) uniform load on all spans, (b) one span loaded and the beams simply supported, and (c) one span loaded, but with the far support fixed.

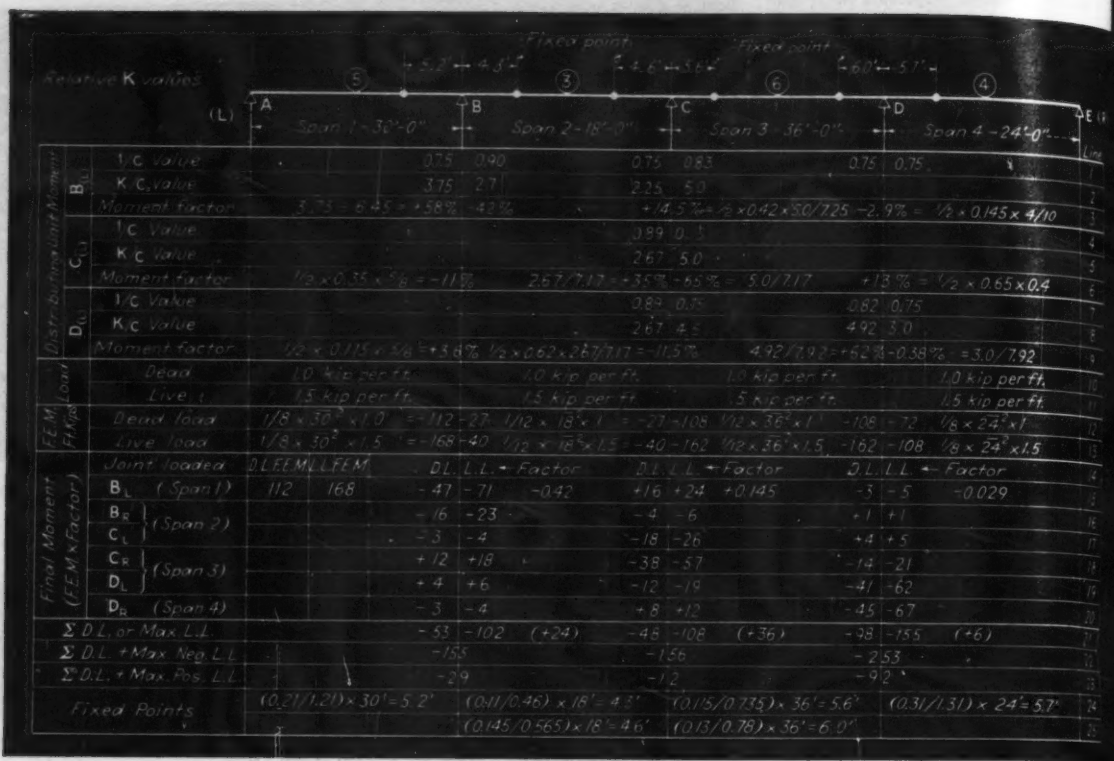

Fig. 5. Computations to obtain data for plotting maximum and minimum moments of a 4-span, unsymmetrical, continuous beam are prepared easily when tabulated in this convenient form.

tributed in proportion to the new K/*c* values.

Had the end support of CD been fixed as shown in Fig. 4c, the l/*c* value for BC would be 0.833 (as obtained from Fig. 2 for a stiffness ratio of 1/0.75x2) and the fixed-ended moment would be distributed as indicated in the illustrative example.

The end rotation constant, in conjunction with moment distribution, is well suited to problems involving the preparation of maximum and minimum moment curves. When working with continuous structures it is convenient to apply a unit moment at each intermediate support and then to distribute this moment throughout. This is especially true where moving concentrated loads are to be dealt with. The fixed-end moments occurring at each joint will produce final moments in proportion to the unit moment, and thus it will be unnecessary to make a new distribution for each new position of the live load.

All of the computations needed in obtaining data for plotting curves of maximum and minimum moments for an unsymmetrical, continuous beam of four spans are given in Fig. 5. The work required to distribute a unit moment at each of the interior supports is shown in lines 1 to 12. The l/*c* values were taken from Fig. 2. Exact values would be 0.906 instead of 0.90 at B and 0.827 instead of 0.82 at D. After the moment has been distributed at joint B, using K/*c* values, the moment carried over to joint C must in turn be distributed according to the K/*c* values at that support. But since none of this moment can return to B, the l/*c* factor for CB is 0.75 in order to make CB a free span. The loading is shown

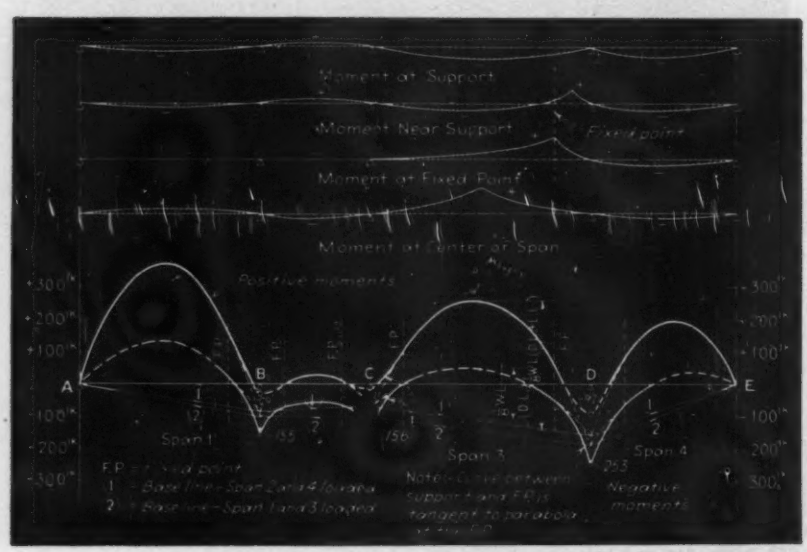

Fig. 6. Qualitative influence lines (a) show the proper loading to produce maximum moments and (b) maximum moment curves are plotted from values tabulated in Fig. 5.

in lines 10 and 11, while values of the F.E.M. are computed in lines 12 and 13. The final moments, due to these fixed-ended moments, are listed in lines 14 to 20 and were found by proportion as indicated in line 15. Lines 21, 22 and 23 show the summation of the final moments in combinations to give the maximum or minimum moment at each support. The fixed points are located in the beam diagram and were determined from the distributions of the unit moment at each interior support.

The criterion for loading to produce maximum moments may be taken from well established rules or may be selected from qualitative influence lines such as in Fig. 6a. While many building codes require only the combination of dead load on all spans plus full live load on some spans (for maximum moment at a support the two adjacent spans and alternate spans would be loaded), the maximum or minimum moment between the support and the fixed point are determined by partial live loads on the span in question. This is apparent from an inspection of the influence line for a point close to the support.

In Fig. 6b curves of maximum moments are shown for the continuous beam of Fig. 5. The construction has been graphical and is self explanatory. Had movable concentrated loads been involved, the curve of maximum moments would be the envelope of each point of maximum moment as the load is shifted across the structure.

A Round Table Discussion Of Moisture Content in Timber

Useful data about moisture content in timber was brought out recently in an informal discussion at an Engineers' Club round table on the West Coast. Two of those present, whom we may call Smith and Brown for convenience, did most of the talking.

"These hastily built timber structures that we are getting in wartime, including some of unusual size and span," said Smith, "seem to me likely to cause a lot of dissatisfaction and trouble when the wood dries out."

"Yes, they will," said Brown, "but nine-tenths of it could be avoided if engineers and contractors would learn what happens to lumber when it undergoes the natural drying-out process."

"Just what do you mean by that?," said Smith.

"Well, the most satisfactory performance of wood, with respect to stabilization of dimension changes," said Brown, "is attained by using properly seasoned and manufactured stock, built into the structure with a moisture content close to what it will be under service conditions. That's basic. But in these times we can't always get lumber in just the desired condition. Wet lumber can be used safely, but not if it is used in just the same way we handle dry lumber.

"In Douglas fir, the most commonly used structural timber on this coast, the fiber saturation point (that is, the moisture content at which the wood begins to shrink) is about 25 percent. From here on down to oven-dry conditions (zero moisture content) the shrinkage is proportional to loss in moisture content. For example, at 12½ percent moisture content exactly one-half the total possible shrinkage will have occurred.

"This timber shrinks a maximum of about 5 percent radially, 8 percent tangentially and very little longitudinally. But ordinarily only about half this shrinkage need be considered—timber never becomes oven dry in the ordinary structure; in fact, moisture content seldom gets much below 12½ percent. A quarter-sawed or edge-grain 4x12 thus might be expected to shrink an average of 1/5 in. in thickness and ½ in. in width while undergoing moisture content reduction from 25 to 12½ percent. At this latter figure the timber no longer gives up nor takes on moisture except as a result of weather changes."

"I see," said Smith, "and I suppose that if two green timbers are accurately fabricated and drilled for two rows of bolts, allowed to dry out, say, to 12½ percent, and then are bolted together at right angles to each other we would be in trouble, wouldn't we?"

"Yes, we would, unless we had been smart enough to previously 'check' one of the members by running a saw kerf midway between the bolt rows, so that the two parts of the timber could each shrink toward the center line of the bolt holes, thus allowing the distance between rows of bolt holes to remain the same as when fabricated.

"Of course," continued Brown, "it is better to design the joint so that the bolt holes are on the center lines of each member, but this can't always be done. When neither this method, the use of a saw kerf nor the fabrication of lumber at its equilibrium moisture content is possible, there is still another course—high moisture content.

"There's no problem about getting timber wet enough. Thus we can plan to fabricate at a moisture content exceeding 25 percent and make sure that the timber is erected while it still has this much moisture. This condition is often easily met and it assures the fit of prefabricated pieces. A custom that fits this condition nicely is the current practice (used on the Navy blimp docks, for example) of giving timber fire-resistant treatment by means of salts applied in water-dissolved form. This temporarily boosts the moisture content and even in warm, dry climates it is possible to get the treated timber erected before it drys out below the 25 percent point where shrinkage starts.

"Three weeks to a month or more is required to dry out salt-treated timber below the 25 percent point and by attention to stockpiling and construction sequence the builders who know this trick get excellent results. When the importance of this moisture content item is recognized and considered, much of the trouble in getting a close fit-up will be avoided."

"But if you put up wet lumber don't the bolts get loose when it shrinks?," asked Smith.

"Certainly," said Brown, "and if the important item of tightening up the bolts is neglected, results may be serious. Ring connectors have made possible more efficient joint design, but contact faces in such joints must not be allowed to separate, the bolts must be tightened periodically until the wood has reached equilibrium moisture content.

Fig. 1. A 40-ft. depth of debris was sluiced from behind Santa Anita Dam. The white line marks debris level before sluicing

The Debris Problem in Flood Control

Paul Baumann
Assistant Chief Engineer
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***Contents in Brief**—Conclusions are given based on Los Angeles County experience with rates of debris accumulation in flood control reservoirs and with sluicing or other methods of controlling or removing it. Data given cover long-term operation of reservoirs on streams with steep regimen and in which floating, suspended and dragged debris are all present in quantity. Debris removal costs trend toward one cent per cubic yard.*

THE PROPER APPROACH to the problem of debris in reservoirs is through a clear understanding of the fundamentals involved in erosion. Essentially, these are that the regimen of a stream, between the mountains and the sea, changes with the influence of gravity which, in turn, varies with the slope. The slope may be nearly vertical at the headwaters and nearly horizontal at the sea. Near the source the stream tends to cut and erode, near the mouth it tends to fill and shoal. Thus erosion is primarily a mountain phenomena. Its result is debris.

For too long a time debris has been misunderstood by engineers and passively accepted in an attitude of "unconditional surrender" that saw no alternative to the building of additional dams when the existing reservoir capacities were filled. The passive attitude is based on the belief that erosion due to rainfall cannot be prevented. This should be corrected to the extent that if erosion cannot be prevented it can at least be materially retarded, because the major portion of the debris originates in instability and consequent slips and slides due to trenching. This action, however, depends upon swift currents which may be definitely checked by a system of suitable barriers. Whether the barriers required are a few feet or several hundred feet in height, the principle is the same.

The Federal Flood Control Act of 1936 and its amendment of 1938, authorized the Department of Agriculture to undertake erosion control measures in the San Gabriel mountains of southern California. Local agencies had been engaged in similar work for three decades and enough progress has been made in coping with debris to justify a rather cheerful approach to the problem of desilting reservoirs.

For more than 20 years the Los Angeles County Flood Control District has regulated and conserved flood waters by means of reservoirs in the principal canyons of the San Gabriel Mountains or immediately below them. These reservoirs are formed by dams of various types and magnitudes. Unfortunately, in planning and designing the dams the debris situation has not always received due attention. As a result, suitable sluiceways have not always been provided where and when water conservation appeared to be more important than flood control. This has been found to be incompatible with dams below mountain watersheds. In fact, sluiceways are essential appurtenances and deserve careful study and design to attain satisfactory results in the removal of debris from these reservoirs.

The significance of such removal appears in loss of storage capacity that has occurred in thirteen district reservoirs. This loss amounts to about 16 560 acre-ft., or 15.5 percent of the original aggregate capacity. Based

the cost of original storage capacity, this represents a capital loss of nearly 4½ million dollars. These dams have been in service for periods ranging from 5 to 23 years.

Debris consists of three principal types, namely, floating, suspended and dragged. Of these, suspended debris is least important, as far as fine particles and flood operation of dams are concerned, as it will readily pass through control works with the water. This leaves floating debris or trash and dragged debris, or detritus, to cope with. Obviously, either one may also be temporarily in suspension because of trash getting waterlogged and sinking or detritus getting agitated and lifted.

Flood Regulation

The volume of trash produced during major floods on these streams is such as to cover hundreds of acres of reservoir surface, often 5 to 10 ft. in depth. Its bulk is dead wood, no doubt due to forest fires to a considerable degree. It forms the primary hazard to reservoir operation during floods unless the water surface is being kept well above the top of trash racks on outlets. Its size ranges from tiny twigs to large logs of considerable length, and its character in general is such as to defy any undertaking to discharge it in the course of storm operations, except over open spillways of adequate size and clearance. The latter method, however, is only practicable if spillway flow is compatible with flood regulation and if the trash so discharged is not likely to create a worse problem below the dam.

As a rule it is necessary to remove the trash from the reservoir after the flood has subsided by mechanical means or by booming, beaching and burning. If possible these operations are performed with the aid of prevailing winds. This elimination of trash is desirable to facilitate subsequent flood regulation, which naturally calls for the lowering of the reservoir to the initial operating level.

However, time intervals between flood-producing storms are often too short to complete the elimination of trash. Special attention must then be given to floating trash booms made of flexibly connected logs or poles of adequate size, spanning the reservoir at strategic locations a suitable distance above the outlet works. Construction of these booms must be such as to resist the trash load under the influence of current as well as wind.

In providing minimum clearance, the eventual waterlogging and sinking of floating trash must be considered. With outlets in operation these sinking pieces will, due to filament velocities, also be carried downstream along a "ballistic" curve. Unless the clearance is adequate, they will land against the trash racks instead of on the bottom of the reservoir upstream therefrom.

Conditions governing sluicing

If sluicing of debris is to follow a flood, it is necessary that floating debris be eliminated or at least controlled. This necessity is a governing time factor relative to sluicing opportunities.

The grounded trash, which is entrapped in and mixed at random with the detritus in contradistinction to the floating trash presents a separate problem. The difference is due to two principal factors: (1) its concentration relative to proximity to the sluiceway is smaller and (2) its rate of movement is slower, as it is not governed by surface (stream line) velocities but by the drag on the bottom of the stream. The two factors combined make it possible to handle manually, mechanically, or both, the trash transported with the detritus and to prevent the clogging of trash racks by extraction of pieces too large or crooked and to guide others to pass between the bars and out through the sluiceway.

It is axiomatic that the spacing, shape and rigidity of the bars have a direct bearing on the size of trash passed between them and the effort required to cope with the rate of its movement. The district has, therefore, developed design standards (*ENR*, Dec. 16, 1943, p. 891) that have so far proved to be quite successful. These standards may be summarized as follows:

1. The racks must be of the riser type and designed for full head between the sluiceway and the next outlet or spillway above it.
2. The bars must be rigid to avoid appreciable lateral deflection with a minimum number of spacers.
3. The spacing between the bars must be a minimum on the outer or upstream side of the rack and a maximum on the inside.
4. The minimum or critical bar spacing must not exceed one-half of the smallest dimension of the outlet or its controls.

If these conditions are complied with a maximum quantity of trash and detritus will enter the critical spacing and will readily pass between the bars and through the sluiceway without undue hazard.

Besides the advance in the design

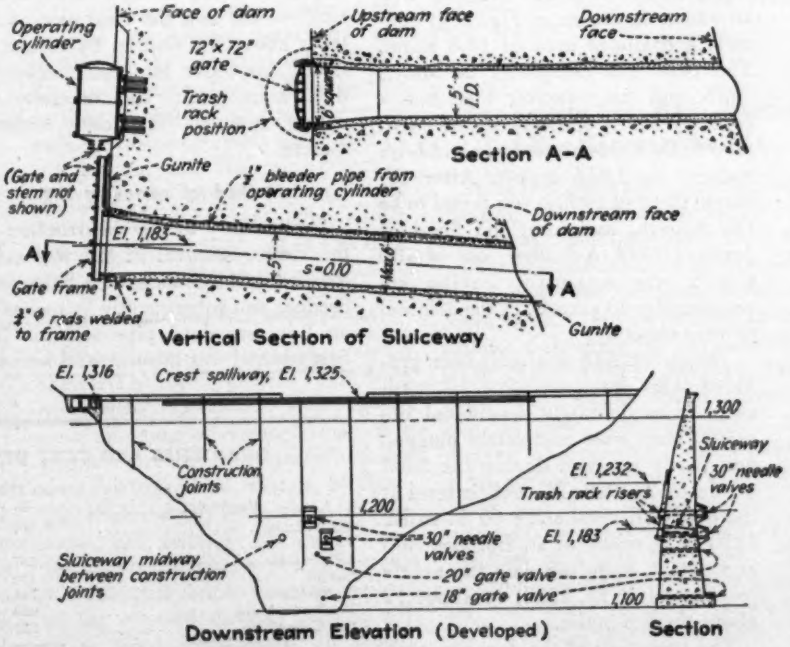


Fig. 2. Plan and elevation of Santa Anita Dam showing location and details of sluice outlet for control of debris.

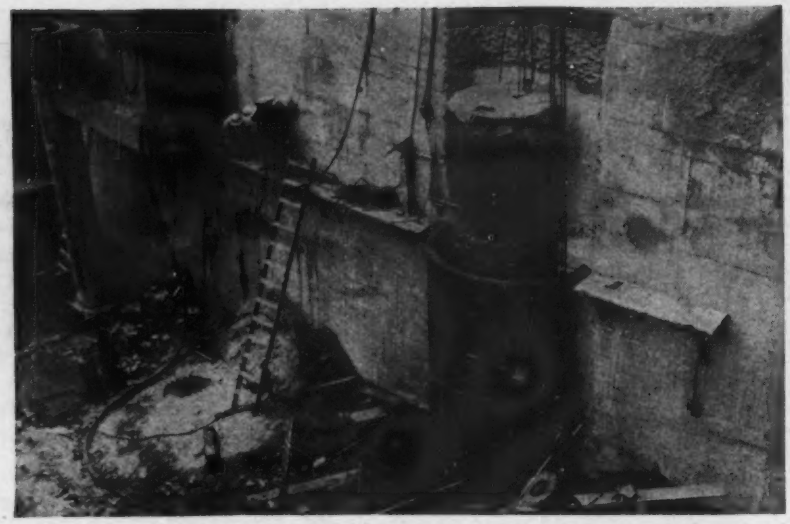


Fig. 3. Hydraulic cylinder gate and trash rack at upper end of Santa Anita sluice outlet. These were added recently, using second-hand materials.

of trash racks and outlets, the district has given due consideration to sluiceways proper and is now engaged in installing one at its Santa Anita Dam. As it is typical of sluiceways for dams where this vital appurtenance had been originally omitted, it may well serve as an example. Incidentally, the history of its outlets, and particularly their revision, is likewise typical.

Typical outlets and sluiceways

A composite section of Santa Anita Dam, a variable radius concrete arch structure, is shown in Fig. 2. It controls a drainage area of 10.8 sq.mi. The dam was completed in March 1927, and the reservoir then had a capacity below spillway lip of 1,376 acre-ft. By 1937 the capacity had been reduced to 1,014 acre-ft. After the March flood of 1938 it was found to be 687 acre-ft., and after the flood of January 1943, a further loss of 137 acre-ft. was measured, leaving approximately 40 percent of the original storage capacity.

The outlets had originally been provided with the cage type of trash racks, now definitely considered obsolete. They were completely plugged and partly wrecked during the flood of March 2, 1938. The debris level at the dam had risen some 60 ft. to El. 1210 as a result of it. Between 400 and 500 ft. from the dam the debris level stood at El. 1215, or about 17 above the top outlet.

The operation of the dam was seriously menaced beyond the clearing of and repair to, the original trash racks. To provide reasonable clearance above the debris level, plans were prepared for two semicylindrical concrete riser shells with steel reinforcing, topped by riser type trash racks. The latter may be readily raised if necessary to assure self-clearing operation. This is not true of the cage type trash racks.

It had previously been determined that trash racks should be kept sufficiently below the reservoir surface to prevent clogging by floating debris. Hence, to avoid conflict between this requirement and the clearance of intakes above the bottom by means of risers, respective limitations must be duly considered. The necessity of debris removal is closely related thereto.

Method of removing silt

Preliminary to the construction of the risers, removal of silt was commenced first by means of a Sauerman dredger and subsequently by means of an 8-in. standard pipe siphon. The first method was unsuccessful because of the fluid condition of the material and the resultant flowing back into the excavated trench. The second method succeeded.

With the outlets plugged the inflowing water had to pass over the spillway, the lip of which is 9 ft. below the crest of the dam. By lowering the pipe to and into the silt in the reservoir and by extending it over the top of the dam and down about 50 ft., adequate subpressure was produced to discharge a high percentage of silt with the water until the debris level had been lowered enough to clear the old trash racks and to dewater the reservoir. Finally the 20-in. outlet at El. 1160 was cleared and was used as a sluiceway after stream flow had dropped to a few cubic feet per second. Risers were then constructed as shown in Fig. 2.

Aside from the trash rack question, clear water outlets are not suitable for sluicing, as they generally lack adequate size and slope. The contrast between them and a sluiceway designed as such is shown in Fig. 2. The regimen at this dam is narrow and steep. Hence the drag is great and much of the debris moved correspondingly large. Consequently, the sluiceway is twice the size of the water outlets and many times as steep.

Trash rack and sluiceway gate

The trash rack is semicircular and of the riser type. Old 60-lb. railroad rails with the flange toward the inside and the head toward the inside are used as bars. The diverging space between the bars in the direction of flow is thereby provided.

Control of the sluiceway is effected by means of a 72x72-in. hydraulic slide gate (Fig. 3) removed from another major dam. The gate will operate with oil circulated through a gate line-motor-driven pump at the crest of the dam. The operating machinery is also second hand equipment. The sluiceway has been completed to

QUANTITIES AND COST OF SLUICING OPERATIONS, 1941-1943

Reservoir	Stream Flow (Acre-Ft.)	Est. Debris Moved (Cu. Yd.)	Total Expenditure	Cost per Cu. Yd.
Big Tujunga	7,597	907,200	$5,256.01	$0.006
Eaton	1,100	66,150	323.50	0.004
Devil's Gate	11,037	1,135,930	3,113.98	0.002
Sawpit	956	199,240	4,850.46	0.024
Sierra Madre	1,744	48,390	1,800.34	0.037
Big Santa Anita	966	235,390	1,825.88	0.007
San Gabriel No. 2	702	169,880	5,594.58	0.033
Total	24,102	2,762,180	$22,764.75	$0.008

Fig. 4. Shear boards can be used to direct the flow against caving banks during sluicing operations, thus maintaining the cutting and caving. This increases the load carried by the stream. Boards are moved as required.

depth of about 8 ft. from the upstream face of the dam. The balance is being holed through from the downstream face. Cost of the sluiceway complete is estimated at $21,000, including desilting operations. The latter were accomplished by means of holes cut alternately in the two risers as the debris level was lowered.

From the foregoing it follows that sluiceways may, if properly gated, always be used as outlets but outlets not always as sluiceways. A combination of the two is obviously desirable from an economic point of view. Eight of the district's sixteen dams have been so provided.

Sluicing operation

Sluicing is done by means of the water power residing in stream flow, generally utilizing the recession of flood flow. Its effectiveness depends primarily upon the magnitude of the drag, which in turn is governed by the weight of the water column and the slope of the streambed (see *Transactions Am. Soc. C.E.*, 1929, p. 518, *et. seq.*).

The cutting action of the water may be enhanced by shear boards placed near, and directing the stream into the banks (Fig. 4). However, the total percentage by volume of solids a stream is capable of transporting in suspension and as bed load is limited, the latter by the drag and the former by the relative fineness of the particles and the turbulence of the water. Artificial aid in sluicing must therefore be planned within these limitations lest it becomes a wasted effort.

The bulking of stream flow by detritus up to about 6 in. in size may be as high as 25 percent by volume and as low as 5 percent according to physical conditions and manpower. It will average about 10 percent. Approximately 75 percent of the detritus is subject to sluicing.

Quantities and cost of sluicing operations at district reservoirs are shown in the accompanying table. The figures are not entirely up to date as they do not include the result of such operations recently completed or still in progress. They do, however, show that the trend of the cost per cubic yard has been reasonably steady and that the average cost is less than one cent per cubic yard.

Effect on channels below dams

Few adverse effects of sluicing on channels below dams have so far been experienced. Temporary shoaling and even plugging of channels may as a rule be corrected by means of suitable reservoir operation, that is, by flushing. If sluicing is temporarily discontinued and water is allowed to pond and clarify, the discharge of this water at a rate compatible with the regimen of the affected channel section will cause scour, particularly in freshly deposited materials.

Fortunately, there are few unimproved channels below district dams, the regimen of which is so flat in sections as to defy the removal of sluicing shoals by means of flushing operations and to make mechanical removal necessary. But even then sluicing, in all probability, would prove to be economically justified.

H. E. Hedger, Major, Corps of Engineers, U. S. A., is chief engineer of the Los Angeles County Flood Control District; M. E. Salsbury is acting chief engineer.

Standards for Adjustable Traffic Signal Heads

Standards governing purchase specifications for adjustable face traffic control signal heads have been approved and published as an American Standard by the American Standards Association. They cover such specifications as housing, doors, gasketing, traffic signal lenses, reflectors, lamp receptacles, wiring, visors, trunnions and brackets, exterior finish and method of mounting, with a supplement governing arrow lens and walk lens. The new standards were developed under the leadership of the Institute of Traffic Engineers.

These standards are available from the American Standards Association, 29 West 39th Street, New York. The price is 25 cents per copy.

Trial by Jury

On a 100-Year Water Pipe Design

***Contents in Brief**—Looking to postwar construction at Seattle, Wash., plans were drawn for a water transmission line of 6½-ft. diameter to last 100 years or more. When the designs were passed around for criticism, up and down the Pacific Coast, various views on long-life design were brought out. These are here summarized with concluding comment by the originator of the design.*

IN SEATTLE'S LIST of postwar projects is an item providing for increased capacity of the water supply in the form of an additional water transmission main to supplement other lines now in service. While there is yet time to give deliberate attention to comparison of designs, studies have been made looking to secure that type of construction that can be expected to give the longest possible life. It is hoped that a main could be built that would continue to serve for a minimum of 100 years. Barring earthquake or deliberate damage, such as bombing or destruction by sabotage, proponents of the long-life design believe that it might be possible to build for a 200- or even 300-year life.

Designs were drawn up for a reinforced concrete pipe with a sheet copper lining, of which details are shown in the accompanying drawings. The copper sheets are of nineteen gage (about 2 lb. per sq.ft.) and are to be pressed or clamped tightly around the No. 8 copper wires which are to be set 1 in. from the inner surface of the pipe. Thus, any pull tending to withdraw the copper sheet (and the wire around which it is fitted) would put the adjacent concrete in shear. Joints between copper sheets are to be made by the copper-welding process that fuses the metal. The wood forms for the concrete are to be assembled first, the copper placed around them and then the concrete is to be poured, embedding the portions left projecting for that purpose.

With the foregoing brief explanation of function and purpose, the plans were "passed around" along the Pacific Coast among those thought to be in a position to offer constructive comment. Comments did, in fact, result and the more pertinent points, with a concluding note from the originator of the design, are given in the following.

Pipe manufacturer's comment

In many years of experience no condition has been encountered that would necessitate a copper lining in a concrete main for domestic water. Though many linings and coatings for use in concrete water pipes have been proposed by promoters or designers inexperienced in this field, it has been definitely established that the normal body and surface of a well-made concrete pipe is entirely satisfactory and will stand up indefinitely without harmful deterioration.

The tendency of a designer exploring some new field is to over-design. Our long experience definitely indicates this copper lining idea may be classified as over-design. To call for bids on such a design which we rate as unnecessary, ill advised and uneconomical, might be to lose the advantage of bids from firms best able to make the most durable pipe.

Not only is the additional cost of a copper lining unnecessary but its anchorage into the pipe structure and the making of these field joints would add further to cost and practical construction difficulties.

Our experience indicates the joint to be questionable from a design and installation standpoint. Although the locking key looks well on the drawing, it would be very difficult to fit, and we are not convinced that it would add appreciably to the effectiveness of a completed pipeline. The reinforcement as shown would not produce adequate structural strength within the pipe, and we question whether the copper sheet would, in fact, be insulated from the steel reinforcement.

Admitting the menace of a leaching action on concrete in structures of other types exposed to weather and moisture, we have never heard of leaching in a well-made reinforced concrete pressure pipe carrying domestic water and buried underground. A very long list of successful records can be cited to support belief in the durability of such pipe.

We are familiar with concrete water pipelines which, after 30 years of service, are unaffected and have smooth interiors. This despite the fact that the concrete in those pipes must, of course, be greatly inferior to that produced by modern methods. In our opinion, a concrete pipeline can now be built, without any metallic lining, with a definite life expectancy of 100 years.

Thoughts from a superintendent

I have discussed the design of the copper-lined concrete pipe with a group of five of our engineering staff. The composite opinion follows:

1. We see no objection to lining the pipe with copper if it is economical to do so. Copper is rather resistant to action by ordinary waters, but we do not know just what time limit could be put on that.

2. The outside reinforced concrete shell can be designed for any reasonable pressure, but we have had no experience that would set an ultimate life on pipe of that type.

3. The reinforcing is subject to action of the water which will seep in over a period of time and also to electrolytic action. The plans refer to a coat of coal tar on the outside, which we presume is to keep the water out of the concrete. If that is sufficient on the outside, would it not also be sufficient on the inside instead of the cop-

per? Many steel pipelines are laid with coal tar coating and the life of the line is dependent upon the ability of the coating to protect the metal. So far as we know, there is no experience that would definitely tell how long the coal tar would be effective.

4. We note that the locking key is made to fit over the reinforcing rods which are bent at both ends. We question the ability to bend the rods and to set them so that the locking keys will all be equally effective. The locking key device would also require that the pipe be laid absolutely straight, unless special keys are to be made for each bend. Would it not be better to let the bars lap and weld them? This would allow for slight changes in alignment and yet give the necessary strength. We question the ability of the bent bars to carry much load. If they are expected to, they should be bent completely over and carried back into the concrete.

Research engineer's opinion

The copper lining design looks all right; sounds reasonable. The only point here that I suggest be considered carefully is the risk of metallic difference between the copper wire and the sheet copper. In this particular, reliance would have to be placed on chemical analysis. The point is there should be no danger of bimetallic action where these two metals are in contact.

The major question about the whole design is the joints between pipe sections. The design shown on the sketches may be better than it appears at first glance. What assurance is there (so far as experience in actual service goes) that this type of joint will have a long life?

In all of our concrete structures it is the joints that are the vulnerable spots. In a large percentage of failures the trouble began at the joints. Only a joint whose merit has been proved in service should be accepted in a design aiming at 100-year life.

What a chief engineer thinks

In view of the high cost of copper and the need for restricting use on materials of this kind, even in the postwar period, we have made some estimates to determine the relative cost of raising the pH of the water to a point where it would not attack the concrete.

If it was assumed that the line would operate at an economic velocity of 6 ft. per sec., this would give a flow of some 200 sec.-ft. for the 78-in. pipe. Using this as a basis, the amount of lime necessary to treat the water was computed and the cost of the copper lining was also computed per mile of pipe. (Mineral analysis of the Seattle supply was known from a recent report of the water department.)

On this basis we found that for a length of line less than eight miles, it would be more economical to use the copper lining, but for a longer line a saving could be effected by treating the water with lime as required for pH adjustment.

There are one or two structural features that have occurred from an examination of the drawings:

(1) In case of a break in one of the welds in the copper lining, permitting the water to get behind the lining, trouble might be experienced due to the tendency of the water to tear the copper from the concrete.

(2) It would seem to be very difficult to get the longitudinal spacer

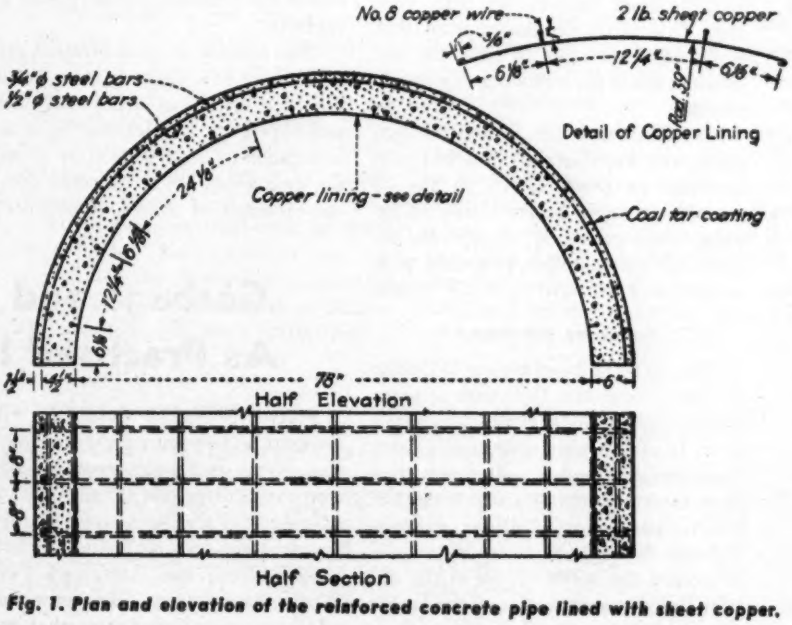


Fig. 1. Plan and elevation of the reinforced concrete pipe lined with sheet copper.

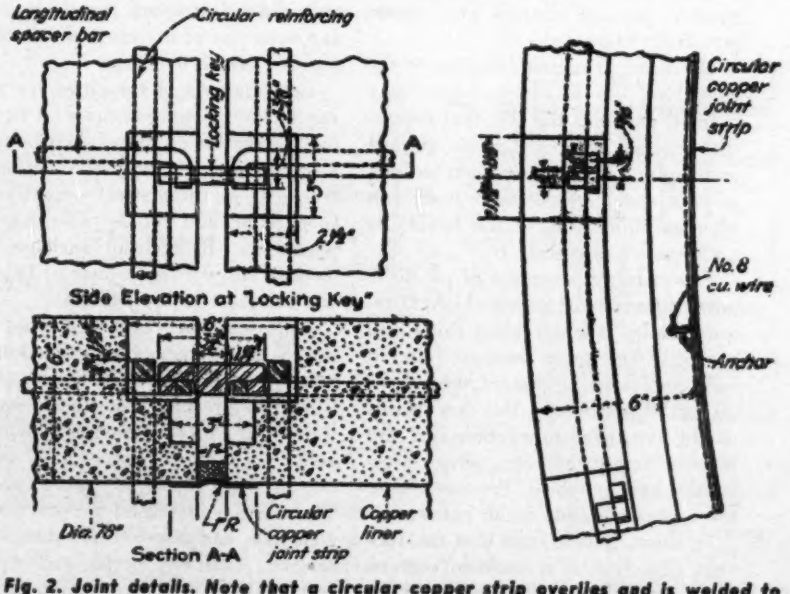


Fig. 2. Joint details. Note that a circular copper strip overlies and is welded to copper lining at joint, with a slight "U" for working. Jute forms soft backing for copper to work against.

bars accurately located so that there will be no trouble in inserting the locking keys. Possibly this could be overcome by welding the keys to the bars.

Offhand, it would appear that in case it is not desirable to raise the pH of the water by lime treatment, sufficient protection could be given to the inside of the pipe by application of asphaltic or coal tar products to prevent the leaching out of the lime in the concrete. This leaching can also be held to a minimum by the use of a well-designed concrete of high density. This is on the assumption that it would be possible to shut the line down at times for renewing this inside coating.

Assuming that the structural features are satisfactorily worked out and that no break occurs in any of the copper welds on the inside of the pipe, there certainly should be no question but that this proposed pipe would have a life of over 100 years.

Usefulness questioned

The advisability of trying to design a water pipe to last 100 years or more was challenged by several waterworks men. If such a pipe costs much more than one designed for 50 years, they said, there is possibility that water delivery cost per million gallons, through the 100-year line, may equal or exceed the delivery cost in the 50-year line. Interest makes up the larger part of total cost—if initial cost is greater, interest charges are correspondingly increased.

However, principal criticism of the very long life is obsolescence, they pointed out, plus the fact that municipal officials are reluctant to discard and replace any improvement so long as it is usable. This holds true even after continued use of the facility is no longer economical.

The example was cited of pipelines now in service 70 years which ("unfortunately," the operators said) will probably last some time yet. Had it been necessary to replace these lines 20 or 30 years ago the new mains would have been of another size and in a different location where they would have enabled the system to serve present needs much better.

In short, it is argued that the 100-year life, even if it were to cost no more per million gallons of water delivered, is not so desirable as a shorter life, say, 50 years, which would give more flexibility and an opportunity to keep the system abreast of changing needs and growth of the community. Moreover, renewing a line after 50 years of service would afford a highly desirable opportunity to look ahead to what then seemed to be the future needs.

The designer's last word

All of the comments were carefully considered by the originator of the design, W. C. Morse, superintendent of the Seattle Water Department, who added the following observations and comment:

"The amount of consideration given to the long-life design is most gratifying; the criticisms are exactly what was hoped for. It is interesting to note how much of the criticism by some of the commentators is canceled out by the opinions of others. A number of suggestions, particularly in reference to the joints, are most worthy of consideration.

"The reference to 50 years as a desirable life limit so that the flexibility of a system can be retained, does not apply to a transmission main that is to be added to existing mains to meet need for an increase in the permanent supply requirement. The question of obsolescence within the life period becomes of minor importance if the city is to continue to exist at its present size or larger.

"Finally, in proposing a possible 100-year life as against a shorter period, it is of course necessary to weigh the over-all cost, including the interest that the invested capital is worth. It is also necessary to determine that the proposed structure will be fully useful in the particular location throughout its life period."

Garbage and Refuse Collection As Practised In California Cities

Sixty-two of 116 California cities covered in a recent survey use municipal crews and equipment in collection and disposal of garbage and refuse, 62 charge fees and 54 provide tax-paid service, according to information from the American Public Works Association. The acute labor situation was relieved somewhat, these municipalities report, largely by raising basic pay of drivers and collectors and by paying overtime.

Less than six of the cities are having serious trouble because of equipment breakdowns. Several cities operating municipal services transferred trucks from their street departments to garbage and refuse collection departments. Residential garbage collections still are made once or twice a week in most municipalities.

Approximately half the cities reduced the frequency of collection of refuse—combustible or non-combustible. Before the war these wastes were picked up once a week; the usual collection period now is once every two or three weeks or once a month. The war has increased the practice of collection and disposal as a municipal service, with city crews and equipment as well as the operation of this service as a self-supporting enterprise by charging fees, instead of paying for it out of the general municipal fund.

Many cities were forced into the garbage and refuse collection business by the war which required numerous changes in management and many collection improvements. However, the general California practice of feeding raw garbage to hogs has not been altered in any way.

Examples of the way in which municipalities have solved the problem include the following: Sacramento has municipal collection and disposal on a fee basis for which the minimum rate is 50 cents a month for one weekly collection, and the business district pays according to the amount of material removed and frequency of collection. Tulare, Cal., instituted a new municipal service, which before that time was handled in a hit or miss fashion by three or four private operators. Though residents are not forced to accept municipal service most of them agreed to pay $1 a month for garbage collection. San Mateo, Cal., has a municipal tax-paid service for garden trimmings only. The city limits the amount to be picked up and controls how the material shall be prepared. Taft, Cal., collects its own fees but pays a contractor for performing the service.

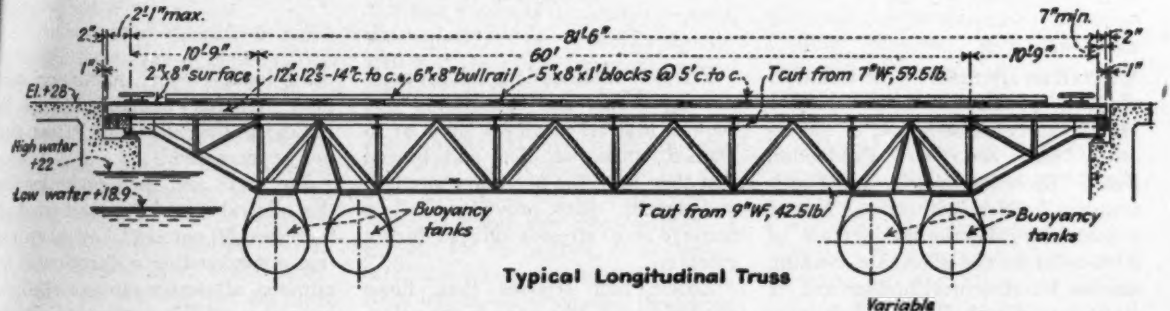
Floatable Bridge is Airplane Taxiway

***Contents in Brief**—To provide a thoroughfare for airplanes across a navigable waterway, a bridge with a deck area of 85x110 ft. was built, designed to be floated away to leave an unobstructed channel. Buoyancy of twelve steel cylinders is controlled by compressed air. The timber deck would keep the structure afloat if tanks were punctured.*

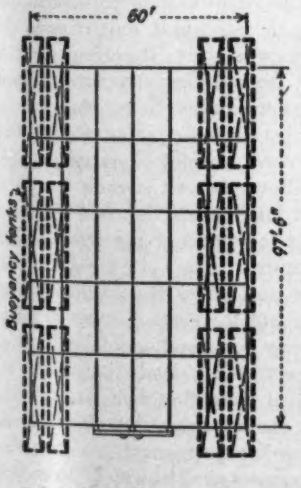
AN UNUSUAL steel-and-timber bridge has been designed to meet the need for the simplest possible means of getting airplanes to a take-off runway that lies on the opposite side of a navigable waterway from the factory where the planes are built. These requirements arise from a shift in plans by which land planes are now being manufactured at a plant where only seaplanes were contemplated when the site was chosen. When the factory was built an adequate ramp was provided for the seaplanes, but when a landing field was later called for, only land on the opposite side of a canal was available. One of the prerequisites set down at the outset was that no structure would be acceptable that was designed to be afloat while the planes taxied across it.

To save critical materials as much as possible, first endeavor was directed toward designing a suitable and economical structure in timber or concrete. In this investigation studies were made of (1) concrete barges of different types, (2) a steel scow with wood trusses, (3) a steel bridge on wood pontoons and (4) a steel bridge making use of circular steel tanks for buoyancy. It is notable that the first three of these types would have required more steel than the all-steel structure with a timber deck, such as was finally adopted.

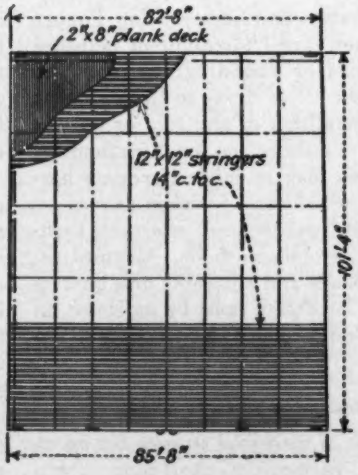
The stipulated load requirements were that the bridge should safely carry a moving plane with 48,000 lb. on each of two pairs of dual wheels, in line and 28 ft. apart, preceded by a nose wheel 34 ft. in advance of the dual wheels and carrying 24,000 lb. Detailed design for this loading was simplified by the fact that live load will be applied only when the struc-



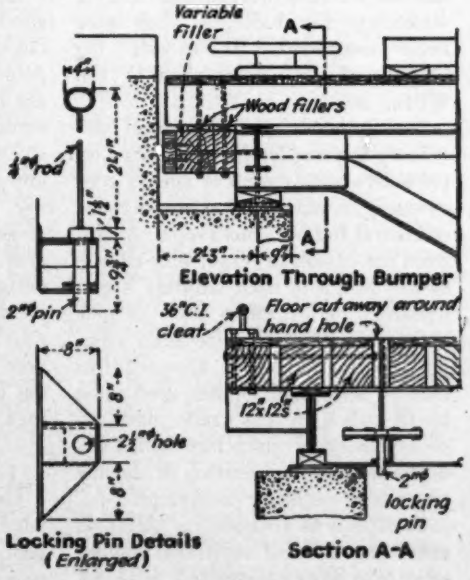
Typical Longitudinal Truss



Plan at Truss Bottom Chord



Deck Plan



Locking Pin Details (Enlarged)

Section A-A

Structural details of bridge structure showing its positioning on the abutments as well as the four rows of steel buoyancy tanks that permit it to be floated out of the channel to permit ships to pass.

ture is resting on the concrete abutments at each end of the 85-ft. span. The bearing at each end of this span is for a length of 101 ft. 4 in. Maximum water level variations in the canal traversed by the bridge are about 3 ft.

The bridge was also figured for the loads resultant from lifting and supporting it on the four rows of steel tanks that float the bridge out when the waterway has to be opened. These tanks, each 5½ ft. in diameter and 34 ft. long, have ungated openings, 18 in. in diameter, on their under sides and pipes through the walls on the upper surface through which compressed air can be admitted to force out the water when buoyancy is desired. As the channel can be cleared by moving the bridge a short distance from its service position, shore connections for a compressed air supply were provided, eliminating the need for portable compressors. The pressure required is only 5 lb. per sq.in. The water displacement in the tanks is such that five of the six pontoons on each end of the bridge provide sufficient buoyancy to float it into position. Thus the bridge would function with one tank on each side out of commission.

It was economical to make the entire deck, both stringers and surface planking, of timber, and this construction provided the additional safeguard that in the event of any circumstances affecting the buoyancy of the cylinders while the structure was floating, the buoyancy of the deck would keep the bridge afloat even after all twelve tanks filled with water. The stringers are 12x12's on 14-in. centers, and over these is laid a single layer of 2x8-in. rough plank surfacing.

Details of the structure, illustrated in the drawings, show a tapering plan of the deck; that is, the inshore dimension is 3 ft. narrower than the width along the outer edge. This facilitates precise placement of the bridge on its supports, and at the same time wedges it firmly and exactly in place. Details of the locking pin arrangement also are shown.

The bridge was designed and its construction supervised by The Austin Co.

Emergency Specifications for Lumber

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Washington, D. C.

A DETAILED ANALYSIS by the technical division of the National Lumber Manufacturers Association of the recently published War Production Board "Directive, No. 29 and Specifications," which instituted on Nov. 1 a mandatory horizontal increase of 20 percent in the allowable working stresses for structural lumber and its fastenings for buildings, has now been completed. It reveals the breadth of the action taken by the WPB.

Under the order, enforcement machinery is provided by requiring that the federal department or agency constructing, financing, or approving new structural lumber construction obtain from the person in responsible charge of the design of each building a certification to the effect that the new WPB specifications have been complied with. The order also requires that all structural lumber used must be identified by the grade mark of, or certificate of inspection issued by, a lumber grading bureau or agency recognized as being competent.

Inasmuch as virtually no buildings are being built of structural lumber other than those constructed, financed, or approved by some government agency, the directive is all-embracing.

The new specifications call for engineering design and supervision and require that all members shall be so framed, anchored, tied and braced that they have the necessary strength and rigidity. Also, provision shall be made to resist stresses induced during erection.

Lower unit stresses than those specified cannot be used in the calculations for the design of the structure. Allowable unit stresses for lumber are not varied for different moisture contents or seasoning; the specified stresses are to apply to timber under any condition of moisture or seasoning. Similarly, no modifications of stresses may be made for decay hazards, which must be taken care of by design, maintenance, selection, treatment or other methods. Assumed design loads and allowable unit stresses used for design must be indicated on the design plans and working drawings.

Increased stresses mandatory

Use of increased stresses for snow, wind, earthquake, short-time or impact loading is mandatory. In the case of snow loading, the allowable unit stresses shall be increased by 15 percent for snow load combined with dead load. Where maximum snow load remains permanently on the building, the allowable stress shall not be increased.

For wind and earthquake loading, the allowable unit stresses shall be increased 50 percent. For other loading, not exceeding a duration of five minutes, allowable stresses shall also be increased 50 percent. For wind in combination with permanent loading, the allowable unit stresses shall be increased by 50 percent, provided that the resulting structural members are not smaller than those required for permanent loading alone. These increases are not cumulative.

Allowable unit stresses for permanent loading may be used without regard to impact if the stress induced by impact does not exceed the allowable unit stress for permanent loading; but the sum of stresses induced by any combination of loading (e.g. impact with dead, long-time live, and/or short-time live loading) shall not exceed twice the allowable unit stress for permanent loading. These provisions shall not apply to modulus of elasticity, a physical constant.

Allowable unit stresses for shear in joint details shall be 50 percent greater than the horizontal shear

values otherwise permitted. In joists supported on a ribbon or ledger board and spiked to studs, the allowable unit stresses perpendicular to grain shall be increased 50 percent.

The allowable unit stresses in compression perpendicular to grain shall be increased for bearings less than 6 in. in length and located 3 in. or more from the end of a timber. The increases vary up to 75 percent, depending on the shortness of the length of bearing along the grain of the wood.

Laminated construction

For laminated lumber construction, allowable unit stresses for compression parallel to grain shall be 50 percent greater than those for the grade and species of the individual laminations, except that 90 percent of the unit stresses for dry, clear material, 4 in. or less in thickness, shall not be exceeded.

The highest allowable unit shear stress for any commercial structural grade shall be used for all structural grades of that species and density in laminated members.

For a laminated member in bending in which the lumber in all laminations within one-tenth the depth of the member from the top and bottom outer faces has been selected from the grade in such a manner that the knots do not exceed one-half the size of the maximum knot permitted in the grade used elsewhere in the laminated member, the allowable unit stress in extreme fiber in bending for the next higher grade shall apply.

The material in the middle three-fifths of the depth of cross-section in a laminated beam or arch stressed principally in bending may be one grade lower than in the upper and lower fifths of the depth without reduction in design stresses.

Overrules building codes

Directive 29 and its specifications do not necessarily conform to all city and state building codes. Directive 29 on lumber will be administered in the same manner as Directive 8 on structural steel and Directive 9 on reinforced concrete, which have been in force for about a year, *i.e.*, where there is a conflict with a building code, the WPB directive and specifications must be observed or the material will not be released for the building.

A careful analysis, made by the U. S. Forest Products Laboratory, the WPB and the Technical Advisory Committee of the National Lumber Manufacturers Association, indicates that the increased stresses are entirely safe and can be used with assurance.

Design stresses and allowable loads for fastenings in wood are derived from test loads by application of a factor of safety. How large this factor of safety needs to be depends on what must be included within it, and it will vary somewhat in size with the particular property under consideration. The factors of safety for wood construction include allowance for variability of the clear wood, effect of duration of loading, effect of strength-influencing characteristics such as knots and slope of grain on the poorest pieces, and indeterminacy.

The portion of the factor for indeterminacy includes such items as allowance for faulty design, faulty construction, overloading, grading tolerances, and design tolerances. It is difficult to appraise what this factor should be for any material due to the fact that it reflects the human element, particularly when design, construction and use of the structure are not subject to technical control. Consequently, in the past, a large factor has been used to cover indeterminacy. The WPB specifications give in detail and require the use of correct principles of design and construction and provide for the posting of the structure against overloading. Therefore, since less is left to chance, the factor of safety may be adjusted so as to make a smaller allowance for indeterminacy than previously without in any way reducing the safety margin.

Years ago, much less was known about the action of wood and correct design procedures. A wealth of research data on lumber and various fastenings has been obtained and widely published in recent years but had not been properly reflected in working stresses prior to this directive. Application of this data has resulted in more accurate design and more efficient grading of the material, thereby removing the necessity for a part of this indeterminacy.

Design tolerance studies made for the first time showed that the timber used is often larger than is required because the section modulus or section area of standard commercial sizes is generally such that it is seldom stressed up to its full working stress under the maximum design load. Therefore, the allowance for design tolerance may be reduced.

Although the variability of clear wood strength in the wood of trees of a given species has not changed, variability is based on the full cross-section of the log. Variability thus shown is greater than would be obtained from samples taken from structural lumber, which comes from the part of the log that has the highest strength values. Hence the previous allowance for variability may be reduced.

Each factor has been considered separately. Consequently, provision was made for the condition where all adverse factors occur simultaneously. The chance of all adverse factors occurring simultaneously is remote.

Short and long time loading

The additional increases in stresses for snow, wind and other short-time loads are based on the known physical behavior of wood under load. The allowable design stresses for lumber and loads for fastenings ordinarily given are for permanent or long-time loading. However, tests show that lumber and joints will carry much greater loads for a short time than permanently. Consequently a factor is included in the safety factor for purposes of adjusting the test results obtained under short-time loading to a stress basis for permanent loading. Therefore, to maintain a given safety of structure, the allowable design stresses should be adjusted upward for loads of short duration as well as be adjusted downward from short time test loading in deriving design stresses for permanent loading.

Actually, the stress increases for short durations of load such as snow, wind, etc. required in the new specifications are less than the proportionate reduction made in converting stresses from a test to a permanent loading basis. Hence, the increases for the short-time loads are more than justified.

R. P. A. Johnson, formerly wood consultant for the War Production Board and a member of the technical staff of the Forest Products Laboratory for about 30 years, has stated: "While the directive will be mandatory only for the duration, we believe that the stresses recommended will prove sound in practice and will be used after the emergency has passed."

Springfield-Holyoke Road Rebuilt as a Divided Highway

***Contents in Brief**—Heavily traveled road serving war industries rebuilt without diverting the traffic to other highways. Unreinforced concrete slabs 9 in. thick used for four traffic lanes. Penetration macadam applied to paved shoulders that serve as parking areas.*

THE MAJOR HIGHWAY PROJECT now under way in Massachusetts is reconstruction of a section of Route 5 in the Springfield area. This work is the missing link to complete several miles of four-lane highway along the West side of the Connecticut River. It will eliminate a bad bottleneck on a road that carries much war traffic and is the second most heavily traveled highway in that state.

The $500,000 project is a 2.1-mi. section of the road connecting West Springfield and Holyoke (Fig. 2). North of the work a four-lane reinforced concrete road without separation of traffic was completed in 1935. South of the project are two sections of wide highway, one a four-lane road of bituminous concrete completed in 1938 and the other consisting of parallel two-lane concrete roadways separated by a 10-ft. seeded median strip, built in 1941. The latter section ends at North End Bridge, in West Springfield, which spans the Connecticut River to Springfield. The work in progress, because of a restricted right-of-way, is a compromise between these designs, consisting of two concrete roadways separated by a 4-ft. paved median strip (Fig. 3). The 7-ft. shoulders are being paved with asphalt macadam.

Each of the new roadways is a 23-ft. wide slab of 9-in. non-reinforced concrete. Because the soil encountered is predominately an unstable river silt with some clay, all the pavement is being constructed on a gravel subbase 12 in. deep in fills and 15 in. deep in cuts.

The new construction is replacing

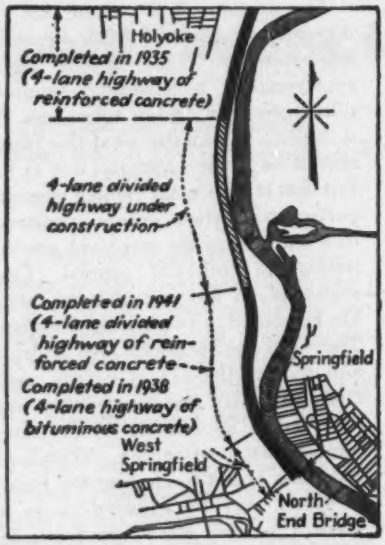


Fig. 1. Work is being carried out to complete four-lane road between West Springfield and Holyoke.

an old concrete highway providing one lane of travel each way. In 1941 this road carried 12,100 cars daily for the entire year, traffic sometimes going as high as 968 cars hourly. In October, 1942, almost a year after war was declared, a 3-day traffic count showed 9,054 cars in one day, with a peak hour of 821 cars. Since much of the present travel could not be bypassed, traffic had to be maintained during reconstruction of the highway.

To meet this requirement, the old pavement was left in place until grading had been completed for the east roadway, the greater portion of which is located clear of the old pavement. After the gravel subbase for this roadway had been placed, it was treated with 0.75 gal. of RT4 coal tar per sq. yd. in two applications to create a wearing surface. This subbase then was used by traffic while the old pavement was removed and the grading and paving carried on for the west roadway. This west slab is now being used by traffic and the eastern roadway is being paved. Construction of the paved shoulders and the median strip follows as closely behind as possible.

One lane paved at a time

Paving operations started at the south end of the project, where the concrete paving contractor has set up a dry batching plant. Each 23-ft. slab is being built as one 11-ft. outside lane and one 12-ft. inner lane. No steel is used in the keyed horizontal joint between neighboring lanes nor in the transverse joints, which are on 120-ft. centers. Dummy joints are used on 20-ft. centers.

Materials for the concrete work are delivered to the batching plant by truck. Proportioning is by dry weight. The mix listed in the accompanying table is being used to produce a 3,000-lb. concrete at 28 days

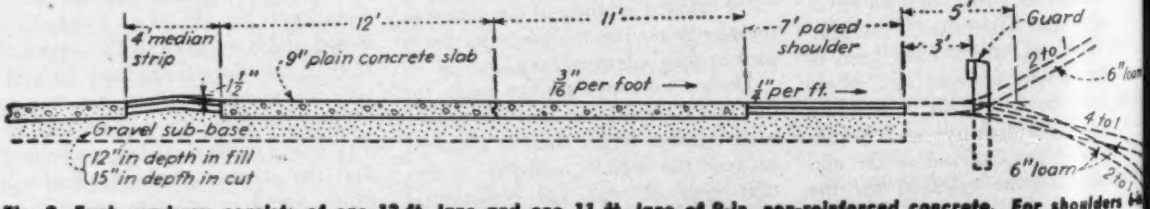


Fig. 2. Each roadway consists of one 12-ft. lane and one 11-ft. lane of 9-in. non-reinforced concrete. For shoulders [illegible] penetration macadam is used. The median strip is 1½ in. of bituminous concrete laid on a sand-bound macadam ba[illegible]

Fig. 3. Paving operations were carried out on one lane at a time, the subbase finishing crews working a few hundred feet ahead of the mixer. At right is the completed west roadway.

All aggregate is crushed stone. The slump of the concrete is about 1½ in.

Concrete is placed by a 27E single-drum paver operating in the lane being paved. Normally the contractor uses 8 or 9 six-ton batching trucks on long hauls and 4 or 5 units on short hauls.

About 120 ft. behind the mechanical finisher and the transverse joint cutter one workman brooms the pavement transversely. Roughly another 75 ft. or so farther back a single worker applies a membrane curing compound with a gasoline-powered spray unit. One gallon of this chemical is added for every 30 sq.yd of pavement.

The concrete paving contractor has a crew of about 45 to 50 workers, including the workmen at the batching plant and the batching truck drivers. Operations continue from sunup to sundown and many days the contractor completes 1,200 ft. of a 12-ft. lane.

Parking lanes, 7 ft. in width, are being constructed as a 6-in. penetration macadam pavement put down in two courses, a 3½-in. base and a 2½-in. wearing surface. Crushed stone of 2-in. maximum size delivered by truck and distributed with spreader boxes is used for the base course. After the base has been compacted by several passes of a 10-ton smooth-wheel, tandem roller, sand is added and hand broomed in place to fill the surface voids. Usually about 65 lb. of sand is required per sq.yd.

Stone for the 2½-in. wearing surface is of the same gradation as the base stone and is applied in the same manner. Next, 1¾ gal .per sq.yd. of 85 to 100 penetration asphalt is applied by pressure distributor and covered with about 25 lb. of ½-in. stone chips per sq.yd. A few days later 0.3 to 0.5 gal. of asphalt of the same penetration is applied and covered with about 15 lb. of ¼-in. stone chips per sq.yd.

The project is being supervised by the Massachusetts Department of Public Works, R. W. Coburn, chief engineer, C. B. Raymond, district engineer, C. M. Damon, district construction engineer, H. A. Corr, resident engineer, and K. C. Prescott, district materials engineer. The Kelleher Corp., Turners Falls, Mass., is the general contractor with Timothy Kelleher, superintendent and F. E. Cassidy, engineer. The Lane Construction Co., of Meriden, Conn., with C. E. Goodell, job superintendent, is doing the concrete work, all other operations being done by the Kelleher firm.

Several operations were scheduled for completion late in 1943, but the loaming, sodding and seeding items not until this year.

MATERIALS FOR A TYPICAL CONCRETE BATCH

Crushed stone 2 to ¾ in.	1,350 lb.
Crushed stone ¾ to ¼ in.	967 "
Sand (dry)	1,400 "
One 94-lb. bag of natural cement	
Six 94-lb. bags of portland cement	
Total water (incl. moisture in aggregate)	34 gal.
Yield	29.07 cu. ft.

Fig. 4. Concrete is mixed by a 27E single-drum paver working in lane being paved. Some days 1,200 ft. of a 12-ft. lane are built.

Highway Research Studies Continued Despite War Restrictions

***Contents in Brief**—Research studies being carried forward by the Public Roads Administration, by state highway departments and the Highway Research Board despite war conditions were outlined in papers and reports at the annual meeting of the board held in Chicago recently. Papers relating to traffic studies were summarized in ENR, Dec. 30, p. 971. Papers bearing on the design of rigid and flexible pavements, stabilization of pavement bases with cements and chlorides and bridge design studies are summarized in this concluding report.*

PROGRESS on a variety of highway research that is being carried forward through the war period as well as on some research designed directly to aid the war effort was reported in the several sessions of the Highway Research Board held Nov. 27-30. Reports of the general meetings of the Highway Research Board were given in *ENR* Dec. 9, p. 862. This report is a continuation of one of the Chicago meetings of the board and of the American Association of State Highway Officials begun in the issue of Dec. 30, p. 971.

Rigid pavement design

R. D. Bradbury, reporting for the committee on rigid pavement design of the Highway Research Board said that much highway research is being affected by the war as many new design problems have been introduced, especially in airport pavement, and war restrictions have made the introduction of new construction methods necessary.

Wartime traffic, Mr. Bradbury said, has increased the loading on pavement to the point where many pavements are showing signs of failure in advance of their anticipated life. This, he observed, makes of these relatively new pavements research projects of the first magnitude which should be closely studied.

New Jersey is conducting a careful study of transverse joints in heavy-duty concrete pavement, according to H. W. Griffin, engineer of surveys and plans of the New Jersey Highway Department. Pavement ends lose their supporting value through water passing down through the joints to wash out the supporting soil. The same happens at cracks, but to a lesser extent. It can be prevented at cracks by adequate reinforcement. At the joints, wood has been tried in New Jersey as a joint filler with some success, both to check the movement of water down into the subsoil and the movement of soil up into the joint. Experiments have been made both with pre-compressed wood and with uncompressed wood.

Before the war, New Jersey began experiments with heavy coiled springs in cylinders placed across the joint in place of dowels, but steel restrictions have delayed the study.

Pavements in compression

Attempts to keep pavement slabs under compression, as suggested by Mr. Griffin, do not yet seem practical, according to H. F. Clemmer, engineer of materials, District of Columbia. Mr. Clemmer thinks a more practical approach is to design pavements in slabs small enough to be free to move. Slabs of 15-ft. length have been adopted by the engineering department for the District of Columbia, and 160,000 sq.yd. of pavement have been built with no reinforcing, no tiebars and no load-transfer devices. The longitudinal joints are given a tongue and groove form. Actual movements have been found to follow the theoretical movements very closely. When steel is again available, Mr. Clemmer said, it should be used to check expansion and for tiebars and load transfer devices. Reinforcing, he said, is of real value in distributing the stress due to initial shrinkage, especially around utility openings.

Pavement cracking

A report of the cooperative study of pavement cracking being conducted jointly by the PRA and the Indiana State Highway Department covering developments in the five years since the test sections were laid was given by S. W. Benham of the Indiana Commission, and H. D. Cashell of the PRA. The sections vary in length from 20 ft. to 1,310 ft. and range in type of longitudinal reinforcement from cold-drawn wire 0.19 in dia. (No. 6) at 6-in. centers to 1-in. dia. steel bars at 6-in. centers. Except in the very short sections, the daily and annual changes in section length are directly proportional to the length of the section. The magnitude of restrain offered by the subgrade is a function of the time in which a given temperature or moisture change occurs in the pavement and it becomes less and less as time goes on.

About 80 percent of the sections less than 120 ft. long are practically free of cracks. In the longer sections, the frequency of cracking increases with the length of the section, being frequently less than 2 ft. apart in the very long sections.

Pavement pumping

Investigations by the highway research laboratories of Purdue University, in cooperation with the State Highway Commission of Indiana, show that 250 miles, or 6 percent of Indiana's total mileage of concrete pavements, are subject to "pumping action," according to K. B. Woods, assistant director of the research project. This action eventually produces excessive cracking of the pavement, which in turn permits serious disintegration of the concrete.

Pumping is most prevalent on very plastic clays and on plastic, silty clay soils. No instance of pumping was observed on granular soils, and only minor actions were found where the pavement sub-base is a silty soil.

Pumping can be minimized by constructing the road with a high-level profile laid on suitable subgrade materials well compacted, using porous berm material, and by adequately sealing pavement joints and cracks. Consideration also should be given to minimizing the number of transverse joints in a pavement, the development of better load-transfer devices, and the elimination of trench construction in silty-clay soils.

Flexible pavement design

Improved methods of flexible pavement design were presented at the second session of the design department, one being outlined by A. C. Benkelman, chairman of the committee on flexible pavement, and the other being presented by Roland Vokac, technical adviser, Berry Asphalt Co. Further information on the studies being conducted by the U. S. Engineer Department were given in a report by T. A. Middlebrooks and R. M. Haines. The report this year gave a brief summary of the accelerated traffic tests on flexible type pavement conducted on special test sections and on actual airfields.

The tests were made on bands three times the width of the tire and pavements were tested to destruction, a LeTourneau "Carryall" with loads ranging from 37,000 to 60,000 lb. being used. They indicate that the pavement thickness curve now used by the army engineers (*ENR*, Jan. 28, 1943, p. 145) are sufficiently close for all practical purposes. Some modification of these curves probably will result from an analysis of the volumetrous data now being collected by the Corps of Engineers.

High quality base materials are generally required immediately underneath the paving course. However, if the subgrade is a clean granular material, a somewhat lower quality base may be employed. High construction compaction of cohesionless subgrades and bases is very essential if flexible pavements are to be used for the heavier airplanes without excessive settlement due to traffic compaction. Greater compaction than can now be obtained economically with modern equipment will probably be necessary if wheel loads are to be increased materially. The authors believe that compaction requirements probably will have to be raised above the modified A.A.S.H.O. requirement.

The authors state that it is extremely important to compact or to drain saturated subgrades if composed of cohesionless fine sands or silt to prevent a "quick" condition from developing. A "quick" subgrade is extremely hazardous and will lead to serious pavement break-throughs.

BASE STABILIZATION STUDIES

A study of the factors involved in stabilizing soils with asphaltic materials conducted by the Esso Laboratories of the Standard Oil Development Co. was reported by August Holmes of the laboratories staff. These show that the quality of a soil-bituminous mix can be materially improved by manipulation of the soil to get a more uniform distribution of the moisture through the soil without any change in the average moisture content. Heat treating of soils also appears to have advantages that would justify further researches into that subject.

Studies of soil compaction show that soil should not be compacted in layers over 2 in. thick due to the low strength of the soils. This latter statement was questioned by A. T. Goldbeck of the National Sand and Gravel Association who said that he did not see how the tensile strength of a soil could be a critical factor when the soil is restrained in a roadbed. In support of this view he pointed to the fact that it is possible to create a high degree of stability in a cohesionless material when it is restrained against lateral movement.

Soil moisture determination

A method for quick determination of the amount of moisture to be added to a dry soil-cement mix on large scale airport construction jobs was described in a paper by M. D. Catton and E. J. Felt of the Portland Cement Association. In the so-called train-lane method of processing airport surfaces, a 6-in. soil-cement pavement is laid at the rate of from 10,000 to 20,000 sq.yd. per day. In processing a 10 ft. lane, 1,200 ft. long, four moisture samples must be obtained after dry application of the cement, the samples must be taken to the laboratory, a determination of the needed moisture made and delivered to the distributor foreman within 15 min. To do this the weight-in-water method of moisture determination was developed using a device called a pycnometer in which the specific gravity of a 1,000 gr. sample can be obtained. Using this value in a chart prepared for the purpose, the percent of moisture to be added can be determined directly. The pycnometer is made with a "mason jar" and some tubing, and the only other piece of apparatus needed is a scale accurate to one grain.

Soil stabilization in China was the subject of brief comment by Mo-Chih Li, professor of highway engineering at the National University, Kunming, China. Chinese road engineers have been experimenting with lime stabilization in the top three inches of clay-bound macadam roads, which otherwise are dusty in summer and slippery in wet winter weather. Similar experiments have been made with burned clay. Both materials have been used for the stabilization of clay roads. Both appear to have value as water repellants, which is an important characteristic on roads built with clays that slake quickly in the presence of water. With such clays it was found that one part of lime to nine of clay made the surface stable. Cement has been found to be better than lime, but the cost has prevented any extensive study.

In discussion of this paper, A. T. Goldbeck raised question as to whether sterates could not be used as water-repellant material in road stabilization and C. A. Hogentogler noted that vinsol resin had been used very successfully in Florida where rains make bituminous soil stabilization almost impracticable.

Soil-cement base construction

California's experience with soil-cement base construction was reported by T. E. Stanton, engineer of materials and research, California Division of Highways, in a paper presented by F. N. Hveem. When the

current cement-treated base construction program was undertaken, the California Highway Division, having obtained the most satisfactory results in using plant-mixed methods for base stabilization with oils, decided to use plant-mixed methods. Most satisfactory results were obtained when the contractor had a large plant capacity, hence a large capacity will be specified in calling for bids on future work.

Mr. Hveem said that early compaction of the soil-cement mixture pays large dividends in final strength. No blading of the surface is permitted as the material bladed into depressions does not bind into the underlying materials but remains as a lamination.

California uses soil-cement mixtures only as a base on which to lay a wearing surface of 3 in. of dense graded bituminous material, and only for primary road work as a substitute for more expensive payment. It is too expensive a method to use for secondary road work.

Soils treated with chlorides

Results obtained in studies to improve "poorly reactive soils" for use in soil-cement mixtures which were conducted recently by the Portland Cement Association were reported by M. D. Catton and E. J. Felt of the association's soil-cement bureau. Soils under study were those that do not meet the wet-dry and freeze-thaw tests satisfactorily and that require a high percentage of cement in a soil-cement mixture. Cement lies practically dormant in some of these soils for as much as 120 days. They are improved by admixtures of other soils, especially clay, and this study was extended to determine the effect of chemical admixtures. Calcium chloride was found to be the most satisfactory, both in the matter of improving the soil and from the cost angle.

Calcium chloride admixtures ranging from 0.2 to 4 percent of the dry weight of the soil were tested. The results showed that 0.6 of 1 percent of calcium chloride, or about three pounds per square yard of 6-in. soil-cement pavement, produced the best results. Similar amounts were added to the more desirable types of soils to see whether the calcium chloride would have any unfavorable effect. None was found.

From the construction angle, it was found that better results were obtained by adding the calcium chloride in solution rather than adding it in flake form, but there was no radical difference.

Losses of calcium chloride and sodium chloride from road surfaces were described by Charles Slesser, research chemist of the Joint Highway Research Project at Purdue University. The study included a determination of the amount of chloride required to reduce heaving in clay soils. It was found that heaving could be completely eliminated if enough sodium or calcium chloride is added, the amount depending upon the soil type. Only two or three percent of either chemical will materially reduce heaving.

Effect of submergence

Following the floods in the Mississippi River that submerged the airport at Omaha, an examination of the soils under the runways was made by W. H. Campen and J. R. Smith of the Omaha Testing Laboratories to determine what effect the submergence had on the compacted soils. Only a few samples were found to have less density than the densities determined at the time the airport was built, and only a few had a higher water content. This confirmed the views of the laboratory staff that the water holding capacity of compacted soils and soil-aggregate mixtures can be restricted. Load bearing values were found to be somewhat less than before the flood due to saturation of the subgrade.

Icy pavements

Practical methods for treating icy pavements, to minimize skidding were contained in the report of a committee headed by J. E. Lawrence, maintenance engineer, Massachusetts Department of Public Works. In selecting abrasive materials, particularly in these days, care should be taken to choose them on a basis of the least deleterious effect on rubber tires, according to this report.

The committee recommended that the sand used for ice control should be clean, hard and free from frozen lumps, with 100 percent passing a $\frac{3}{8}$-in. sieve, not less than 65 percent passing a No. 16 sieve and not more than 25 percent passing a No. 50 sieve. Cinders were described as being a very good abrasive material. They are sharper than sand, cling to tires and cut into ice better than the rounded sand particles.

Mr. Lawrence pointed out that the application of from 300 to 500 lb. of calcium chloride per mile along a 2-ft. strip at the center of roadway, immediately following a snow storm and before any severe drop in temperature occurs will form a salt solution that will do much toward preventing icy conditions.

Drainage studies

Large scale model studies of roadway subdrains being made at Purdue University were reported by T. R. McClelland, research engineer. To date, attention has been directed chiefly to determining the best position for subdrains and the effect of time. In all drainable soils the effect of the drain in lowering the water table is constant, despite the character of the soil, but the time varies. If the time required to lower the watertable to the desired point is greater than the interval between normal rainfalls then drains are of little value.

A position near the outer edge of the pavement is most desirable. Rate of drainage increases with depth of drain. Size is not important if of adequate hydraulic capacity for the anticipated flow.

Bridge abutment design

D. P. Krynine, chairman of the committee on stress distribution in soils, reported that the first draft of the section on abutments for highway bridges for the projected report on the practical application of soil mechanics theory to highway design was out for review by members of the committee and that work on several sections is in progress. The first section was prepared by Jacob Feld, consulting engineer, New York, who said that he is now proceeding to prepare actual designs for several types of bridge abutments. The purpose of this report, Mr. Feld said, is to serve as time saver for designers.

Timber bridges

Extending the life of timber bridges by better waterproofing of the roadway deck was advoted by C. B. McCullough, assistant chief engineer Oregon State Highway Department. In describing Oregon's latest innovations in timber bridge construction he reported that a timber type deck

has been developed which is made up of 4x12-in. planks in the subdeck, covered with hot asphalt and protected by 2x2-in. cedar or treated fir strips laid longitudinally. This waterproof construction will add materially to the life of the structure.

Another highly successful type employs a composite timber and concrete deck which is intermediate in cost between all-timber and all-concrete construction. The substructure is timber and the deck slab is concrete bonded to the timber stringers to act as a composite beam. Here again, the waterproofing character of the deck gives long life to the substructure. This type is especially economical where piles would be needed for any structure.

R. H. Baldock, state highway engineer of Oregon, presented Mr. McCullough's report to the convention. In commenting on timber bridge construction in general, Mr. Baldock asserted that it would be a mistake to continue to use the 20 percent increase in timber design stresses after the war that are being used during the present war emergency. He stated that timber design includes no large factor of safety to start with, and that a certain amount of unavoidable deterioration will lower this factor still further.

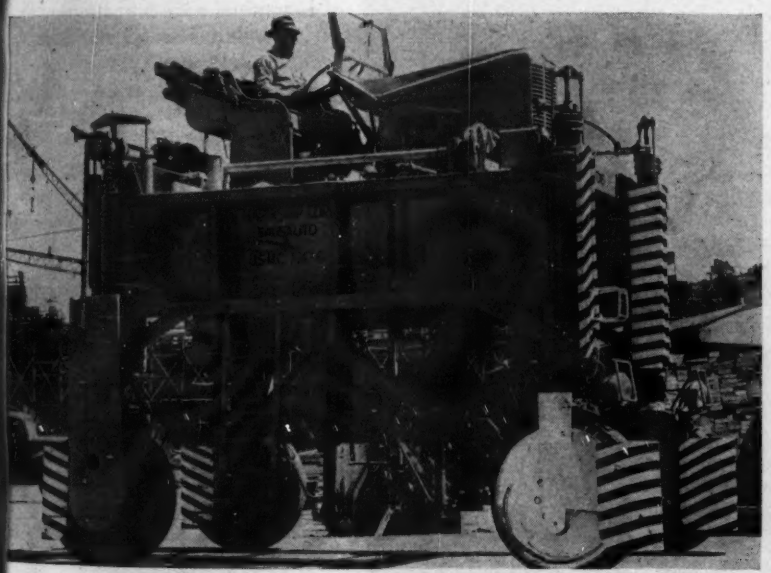
Culvert design

Some of the latest innovations in culvert designs being used in California were presented in a report by G. A. Tilton, Jr., assistant construction engineer, and R. Robinson Rowe, senior bridge engineer, California Division of Highways. Current practice in that state is to design a culvert to pass a 10-year flood without static head on the crown of the structure and to give the culvert sufficient capacity to pass a 100-year flood without interrupting traffic and without serious damage.

Rounding or expanding the culvert entrance will increase its capacity. Where high velocities at the outlets of large culverts damage embankments or abutting property, experimental herringbone roughening and stepping of the floors of culverts is being tried to reduce the velocity. Sidewalls also are roughened with vertical recesses.

Protective Devices Save Tires

Tire life expectancy on heavy equipment has been increased 300 percent in a West Coast shipyard by use of the protective devices shown in the accompanying illustrations. Some such safeguards were necessary, it was decided, when yard records at Marinship Corp., Sausalito, Calif., showed only 30 percent of normal life expectancy due to constant snagging and tearing of tire casings on projecting steel. Since the protection shown has been used, the expectancy has increased to 90 percent of normal. There has been a corresponding decrease of two-thirds the number of replacement tires required monthly.



Steel guards and wheel disk (above), and steel disk, bolted to steel wheels (below) protect side walls of tires.

Before use of these guards, practically every tire on heavy equipment in the yard was found to have deep gashes from contact with sharp steel. Sometimes tires with treads showing barely any wear had wall cuts that made replacement necessary. This situation has been entirely changed by use of the disks on the wheels that protect the side walls and the bumper guards projecting ahead of exposed tires to safeguard against head-on contact. At present every piece of rubber-tired mobile equipment in the yard has a full set of these protective devices.

Two other steps were taken to increase the life of tires: (1) Every effort was made to provide ample clearance on all yard roadways for mobile equipment by more systematic storage of steel and other supplies and (2) an electromagnetic road cleaner was built and operated to keep roadways as free as possible from nails and other sharp metal objects. Operation of this magnet has resulted in a 70 percent decrease in punctures.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

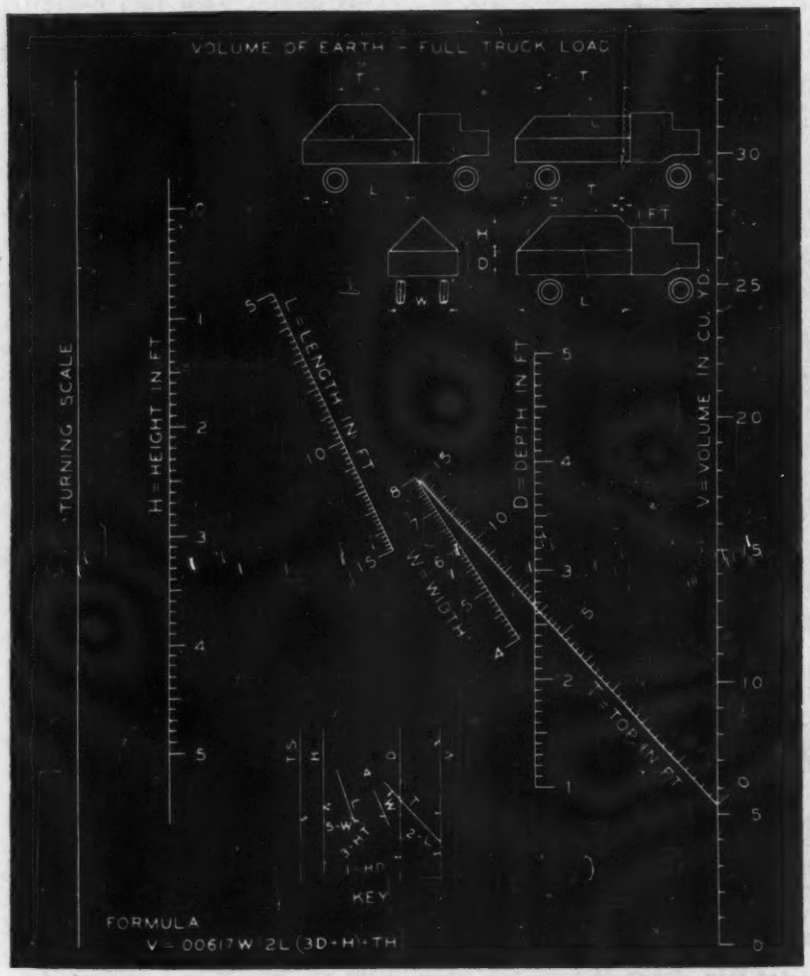
Graph Reduces Work to Determine Earth Loads on Trucks

Sir: Since publication in *Engineering News-Record*, Nov. 4, 1943, p. 699, of my formula to determine earth load on trucks, I have found a reluctancy on the part of some engineers to perform the required computation for each truck load. Therefore, I constructed the accompanying alignment chart for the graphical solution of this formula. Determination of the volume by use of the chart takes but half the time required to compute the load by the formula. Also, the chance of numerical error is eliminated.

Use of the chart is as follows: A straight-edge is laid across the graph to connect the height on the *H* scale with the depth on the *D* scale and to intersect the *V* scale. Pivoting about this point on the *V* scale, the straight-edge is turned to connect the length on the *L* scale and intersect the *H* scale.

After a pencil mark is made at the intersection with the *H* scale, the straight-edge is used to connect the height on the *H* scale and the top length on the *T* scale. This line is extended to the *V* scale, and the straight-edge used to create a line between this point of intersection and the pencil mark previously made. This line is extended to the turning scale.

Finally, the straight-edge is pivoted on the turning scale and made to connect to the width on the *W* scale. Extension of this line to the *V* scale gives the volume.—NEAL B. MITCHELL, *Engineering Dept., City of Salem, Salem, Mass.*


VOLUME OF EARTH - FULL TRUCK LOAD
TURNING SCALE
H = HEIGHT IN FT
L = LENGTH IN FT
D = DEPTH IN FT
W = WIDTH
T = TOP IN FT
V = VOLUME IN CU. YDS.
FORMULA
V = .0617 W 2L (3D + H) TH
KEY

Earth loads on trucks may be determined quickly and accurately by this chart.

Work to Obtain Roots May Be Simplified

Sir: On p. 353 of the Aug. 26, 1943, copy of the *ENR*, Mr. R. W. Stewart gives a method of extracting the square root of a number adaptable to the slide rule, where more than the usual accuracy is required, by the use of calculus. The use of the theorem of binominal approximations offers a very simple means of extracting any root.

In the binominal series

$$(1 \pm r)^n = 1 \pm nr + \frac{n}{2}(n-1)r^2$$

If r is small and compared to the number and n is between the limit of +2 and −2, the first two terms of the equation will give results close enough for the slide rule computations.

Example: Find the cube root of 218.

Take the nearest known cube to 218 and a remainder as 216+2. Then

$$(216+2)^{1/3} = 6\left(1 + \frac{2}{216}\right)^{1/3}$$

in which $r = \frac{2}{216}$ or $\frac{1}{108}$ This is in the form

$(1 + r)^n \backsimeq 1 + nr$.

Where $n\,r = \frac{1}{3} \times \frac{1}{108} = \frac{1}{324} = .00308$.

$$6\ (1 + .00308) = 6.01848.$$

Therefore the simple rule:

Remove the nearest known root from the number. Multiply the remainder by the root removed and the exponent; divide this product by the number removed; add this result according to sign of the remainder to the root removed to obtain a close approximation of the exact root of the number.

C. W. RAYNOR,
Structural Engineer, Bureau of Buildings, Portland, Ore.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

A Directory of Engineers

ITED STATES DIRECTORY OF REGISTERED PROFESSIONAL ENGINEERS—Prepared under the auspices of the National Council of State Board of Engineering Examiners. Lewis Historical Publishing Company, New York 11, N. Y. $15.

Publication of a listing of all gineers in the United States has n advocated for many years but e cost of such an undertaking retofore has proved to be the inrmountable obstacle. Publication this directory has been made pose by the National Council of te Boards of Engineering Exam- s which furnished the publishers h lists of the engineers registered licensed in each state represented the council. The council includes tates except Illinois, Montana and Hampshire. The latter two states e no registration law; Illinois has tered structural engineers for y years, and these are included. here is one alphabetical listing of names and addresses and a geophical listing of names by states. included is a digest of state laws erning the practice of professional ineering.

he publishers state that the direc- will be revised biennially. ether it is or not, presumably, depend on the reception given initial publication.

Timber Design

RN TIMBER DESIGN—By Howard J. nson. 220 pp. John Wiley & Sons, , New York 16, N. Y.; Chapman & ll, London. $3.

N, FABRICATION AND ERECTION OF SS GRADE LUMBER AND ITS FASTEN- S FOR BUILDING—Directive No. 29 of Conservation Division, War Produc- Board. 65 pp. Superintendent of uments, Washington, D. C. 15c.

the basic information needed e design engineer working with is included in the volume dern Timber Design," which was ared primarily for senior civil eers at the Agricultural and anical College of Texas where uthor is associate professor. Frankly a textbook, the volume contains complete details that will enable the designer to follow through the theory and mechanics of design for timber structures. General information on wood and working stresses is followed by chapters devoted to fastenings, design of trusses, bridges, and the like, while other sections cover modern practice in glued and laminated construction and the manufacture and use of plywood. Several pages are devoted to decay, wood-destroying organisms and wood preservatives.

The government publication, "National Emergency Specifications for the Design, Fabrication and Erection of Stress Grade Lumber and Its Fastenings for Buildings", is much more than just a set of specifications. In addition to the government regulations for increasing the stresses of graded lumber by a minimum of 20 percent, it also contains a design manual for structural grades of lumber and information on timber connectors and glued construction. An appendix gives formulas for wood columns, side loads and eccentric loadings.

Building Inspection

MODERN BUILDING INSPECTION—By Clyde N. Dirlam, Harold P. Huls and others. 376 pp. R. C. Colling and Associates, Los Angeles, Calif. $5.

This handbook well fills a long felt want and should be read by every member of every building inspection department and also by every architect, engineer and draftsman engaged in the preparation of plans and specifications for submission to such departments. It has been compiled and edited by an able group who were most prominent, and who played a large part in the improvement and strengthening of building codes following the 1933 California earthquake. Lessons learned there by bitter experience have been well applied in the preparation of the text.

The reasons for a building code and for its proper administration are well set forth. Specimen codes with suggested means of adoption and enforcement are included as are also suggested clauses providing for protection against stresses produced by lateral forces (earthquakes), incendiary bombs, gas attack, air raids and sabotage.

It is suggested that the next editions should stress the duties and responsibilities of the field inspector to a much greater degree. The experience gained from the examination of many hundreds of buildings damaged in the 1933 earthquake led to the belief that damage to structural members of a building was in proportion to the amount of fabrication carried out on the job, that is, under the control of the field inspector. Sawdust in column boxes, misplaced reinforcing and other careless practices were revealed by examination after the damage had been done. Every architect, engineer and inspector engaged in work involving public safety should read the various sections devoted to the duties and responsibilities of the engineer to his client and to the public as set forth by J. A. L. Waddell in his work on bridge engineering.—*Reviewed by* JOHN SWEENEY, *Consulting Engineer, Edgewater, N. J.*

Miscellaneous Notes on Booklets and Reprints

A NEW LIST OF STANDARDS of the American Standards Association is now available from the association's headquarters at 29 West 39th St., New York 18, N. Y. More than 600 standards are listed.

HIGHWAY PLANNERS will find much valuable information in a pamphlet entitled "Public Control of Highway Access and Roadside Development" by David R. Levin, transportation economist, Public Roads Administration, which is available from the Superintendent of Documents, Washington, D. C., for 15 cents. The advantages of limited access to highways are outlined as are the problems raised when access is restricted. Other subjects covered are marginal land acquisition, control of the use of land along highways and restrictions on "ribbon development." A model for a limited-access highway law is

included in an appendix as are copies of the laws in the seventeen states now having such legislation on the statute books.

SURF AND BEACH POLLUTION caused by the sewage discharged into the ocean at Hyperion, Calif., is summarized in a "Report on a Pollution Survey of Santa Monica Bay Beaches in 1942" which has recently been issued by the Bureau of Sanitary Engineering, California State Board of Health, Sacramento. Included are pictures, data on analyses and numerous charts.

THE CLEVELAND CITY PLANNING COMMISSION has effectively dramatized the city's postwar needs in a pamphlet entitled "Things We Need in Cleveland." The needs of various types of public service are set out first by photographs and diagrammatic presentations, and then detailed information is given in an extensive tabulation, including both the estimated cost of the work and the cost to complete plans for the project.

OTHER RECENT PAMPHLETS RELATING TO POSTWAR PLANNING include a clear statement by the Construction and Civic Development Department of the U. S. Chamber of Commerce of the need for advance planning and advance financing of public works. This pamphlet is entitled "Plan Now for Future Public Works." Copies may be obtained from the Washington office of the chamber. The Automotive Safety Foundation, 321 Tower Building, Washington 5, D. C., has published a list of pamphlets, books and articles under the title "Postwar Highway Planning." A study of the magnitude of the postwar reemployment problem by Karl T. Schlotterbeck is available from the Brookings Institution, Washington 6, D. C., for 25 cents.

THE EFFECT OF PUBLIC ASSISTANCE to housing on the Canadian economy during the period of 1935 to 1943 is the subject of a pamphlet entitled "The Labour Value of the Building Dollar" by O. J. Firestone, published by the Department of Finance, Housing Administration, Ottawa, Ont., Canada. The study was made to determine the amount of on-site and off-site man-hours of work provided by the building of over 25,000 housing units. Expenditure of $98,400,000 on this work provided 57,000,000 man-hours of work on the site and about 76,000,000 man-hours of work off the site in industries supplying materials and transportation services, a total aggregate of about 133,000,000 man-hours. The report estimates that 77.5 percent of the total remuneration paid to on-site construction workers went to construction craftsmen, the largest share going to carpenters, 37 percent, and 22.5 percent going to helpers and common labor. The figures for off-site labor are not carried beyond that of the manufacturers of the different types of construction materials.

"FLOOD FLOWS AND STAGES in the Sacramento and Lower San Joaquin Valleys, 1934-42"—a report prepared by the California Division of Water Resources from data from 105 stream gaging stations over an 8-yr. period—includes an account of the functioning of the Sacramento river flood-control project. State Printing Office, Sacramento, Calif.

New Engineering Books

SHIPFITTING SIMPLIFIED—By L. L. Oberman. 122 pp. McGraw-Hill Book Co., New York and London. $1.50.

ANALYTICAL AND APPLIED MECHANICS—2nd Edition. By Guy Roger Clements, and Levi Thomas Wilson. 447 pp. McGraw-Hill Book Co., New York and London. $3.75.

TOMORROW WE FLY—By William B. Stout and Franklin M. Reck. 160 pp. Thomas Y. Crowell Co., New York. $2.

SCIENCE AT WAR—By George W. Gray. 288 pp. Harper & Bros., New York and London. $3.

MAINTENANCE ARC WELDING—The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio. 233 pp. 50c. in U. S. A., 75c. elsewhere.

MOVABLE AND LONG SPAN STEEL BRIDGES—2nd Edition—By George A. Hool and W. S. Kinne. 488 pp. McGraw-Hill Book Co., New York and London. $5.

UNION RIGHTS AND UNION DUTIES—By Joel Seidman. 232 pp. Harcourt, Brace and Co., New York. $2.50.

INTERMEDIATE COURSE IN DIFFERENTIAL EQUATIONS—By Earl D. Rainville. pp. John Wiley & Sons, Inc., New Y $2.75.

CAREERS FOR GIRLS IN SCIENCE & ENGINEERING—By Evelyn Steel. 183 pp. E. P. ton & Co., New York. $2.50.

U. S. DIRECTORY OF REGISTERED PROFESSIONAL ENGINEERS—Compiled with assistance of the National Council State Boards & Engineering Examin 644 pp. Lewis Historical Publish Company, New York. $15.

Reports and Pamphlets

A SOUND PLAN FOR POSTWAR ROADS JOBS—American Road Builders' Asso tion, International Bldg., Washington D. C.

USE OF SOIL-CEMENT MIXTURES FOR B COURSES, No. 7 of Wartime Road Pr lems—Highway Research Board, 2 Constitution Ave., Washington, 25, D

ENGINEERING AND SCIENTIFIC GRAPHS PUBLICATIONS—American Society of M chanical Engineers, 29 West 39th Stre New York, N. Y.

SYMPOSIUM ON PAINT—American Soc for Testing Materials, Philadelphia Pa.

SHORELINE DEVELOPMENT, Preliminary port—A Portion of the Master Pla San Francisco—San Francisco City P ning Commission

POSTWAR PUBLIC WORKS MUNICIPAL H BOOK—New York State Postwar Pu Works Planning Commission in coo tion with the New York State Dep ment of Public Works, Albany, N. Y

ANALYSIS OF CONTINUOUS FRAME GRAPHICAL DISTRIBUTION OF MOME By A. A. Eremin. 1541 37th St., Sa mento, Calif. $2.

CRANES, DERRICKS, AND HOISTS, 1943 American Society of Mechanical E neers, 29 West 39th Street, New Y

THE CONTROL OF RESERVOIR SILTIN Carl B. Brown, Soil Conservation Se U. S. Dept. of Agriculture. Sup tendent of Documents, Washington, 25c.

ORGANIZATION FOR METROPOLITAN P NING—American Society of Planning cials, 1313 E. 60th St., Chicago, Ill.

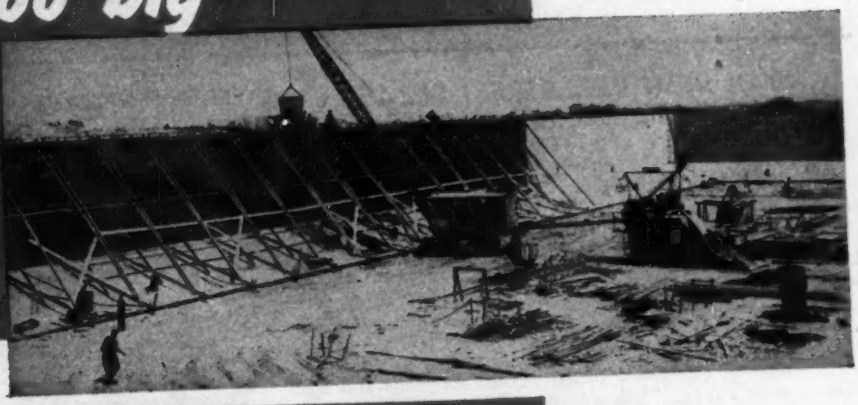
USE OF GROUND WATER FOR IRRIGATI THE SOUTH PLATTE VALLEY OF Colo —By W. E. Code. Colorado Agr tural Experiment Station, Colorado College, Fort Collins.

RETIREMENT SYSTEMS FOR STATE AND L GOVERNMENT EMPLOYEES: 1941— Department of Commerce, Bureau o Census, Washington, D. C.

(*Continued on page 109*)

No Job Too Big

Through the Economy plan, forms for placing concrete can be set-up and removed in less time, and at lower cost. Economy Forms may be shifted from one set-up to the next in large groups or panels . . . a tremendous time-saver on big jobs.



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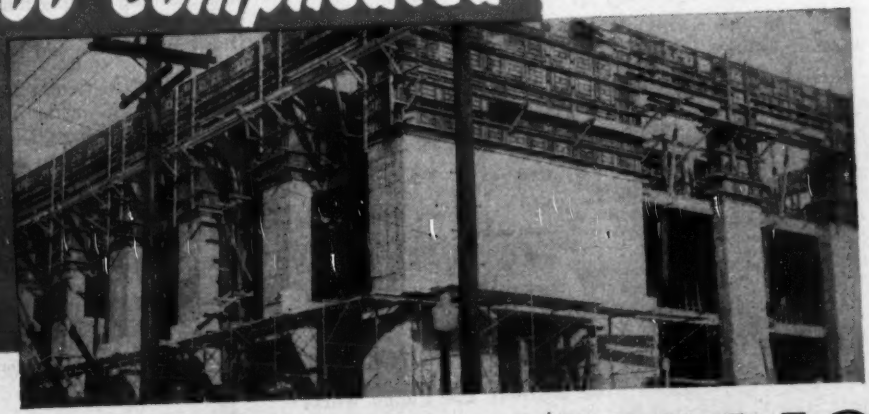


ECONOMY STEEL FORMS

A nation-wide form-rental and engineering service that saves critical material and time in concrete construction. We welcome job inquiries by letter, wire or telephone

Des Moines, Iowa, Phone 4-3101 — ECONOMY FORMS CORP. — Fort Wayne, Ind., Harrison 2363

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

RAIL REMOVAL, STREET REPAIR SAN FRANCISCO, CALIF.

OWNER: San Francisco Dept. of Public Works, John J. Casey, city engineer.

PROJECT: Rail salvage and street pavement repair in connection with trolley rail removal along Guerrero Street between 14th Street and San Jose Avenue in San Francisco, Calif. Involves removal of 42,236-ft. of single track from various types of pavement and repaving necessary trenches and roadway widths resulting from rail removal.

CONDITIONS: Contractor to furnish all materials and complete work in 150 days. Highway transportation facilities available along site of work. Minimum wage rates are: skilled labor, $1.21¼ per hour; semi-skilled, $1.06¼; and common, 95c.

BIDS: Three bids were received November 24, 1943, ranging from the low of $113,225 to $180,278.

LIST OF BIDDERS:

1. Eaton & Smith, San Francisco, Calif. (low bid) $113,225
2. M. J. Lynch, San Francisco, Calif 145,402
3. A. D. Schader, San Francisco, Calif 180,278

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Remove track from asph. conc. paved street with no existing rail headers; constr. an asph. on conc. pavmt. 4-sack Cl. E conc. base and 2-in. asph. conc. wearing surf. in rail trenches	5,519 track ft.	$1.89	$1.70	$3.15
2. Remove track from street paved with asph. conc. wearing surf. with exist. basalt block rail headers; remove rail headers; constr. asph. on conc. pavement, as above	13,380 track ft.	1.89	2.33	3.15
3. Remove track from street paved with asph. conc. wearing surf., with or without basalt rail headers; constr. 4-sack Cl. E conc. base for full depth of rail trenches and flush with exist. pavmt. surf	16,775 track ft.	1.89	2.09	2.75
4. Remove track from street paved with basalt block pavmt.; constr. 4-sack Cl. E conc. base as in Item 3	460 track ft.	1.99	2.52	2.75
5. Remove track; remove pavmt., full width; remove ties; constr. fill; and constr. asph. on conc. pavmt. consisting of 6-in. 5-sack Cl. E conc. base and 2-in. asph. conc. wear. surf. for full width of trk. area	3,833 track ft.	4.29	5.80	7.35
6. Remove track, slot rails, inspection boxes, etc.; remove pavmt. and planking; cut down cable trough and fill same; constr. 6-in. 5-sack Cl. E conc. base and 2-in. asph. conc. wear. surf. full width of track area	1,330 track ft.	6.00	7.06	10.65
7. Remove track from street paved with vitr. brick on conc. base; basalt blocks on conc. base; or basalt blocks on sand; and constr. brick pavmt. on conc. base	1,100 track ft.	3.59	6.39	5.45
8. Remove track; remove basalt block pavmt. full width; remove ties; constr. 6-in. 5-sack Cl. E conc. pavmt. full width of track area	200 track ft.	4.09	5.51	6.40
9. Asphaltic concrete binder	1,100 ton	4.00	7.95	5.50
10. Asph. concrete wearing surface	2,200 ton	4.50	7.95	6.50
11. Remove and replace asph. conc. wearing surface where directed	20,000 s.f.	.10	.165	.13

HIGHWAY, NORTH CAROLINA

OWNER: North Carolina State Highway and Public Works Comn.; W. V. Baise, Raleigh, state highway engineer.

PROJECT: Grading and concrete paving 10.49 miles of U. S. Highway No. 70 between Croatan and the Carteret County Line, in Craven County, N. C. Pavement is plain cement concrete, ranging in width from 4 to 22 ft.; and is 8-in. uniform.

CONDITIONS: Contractor to furnish all material except for drainage pipe that has been salvaged by state, and hog-wire and barbed wire fence which is to be reset. Rail, highway and water transportation facilities available. Work to be completed in 150 days. Wage rates are: skilled labor, 55c. per hour; semi-skilled, 35c; and common, 30c.

BIDS: Four bids were received December 16, 1943, ranging from the low of $229,416 to $260,626.

LIST OF BIDDERS:

1. F. D. Cline, Raleigh, N. C. (low bidder) $229,416
2. J. S. Hill Constr. Co., Washington, N. C 239,377
3. Mecklenburg Constr. Co., Durham, N. C 260,233
4. Y. L. Brown, Richmond, Va 260,626

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing	49 ac.	$100.00	$100.00	$173.00
2. Grubbing	41 ac.	125.00	100.00	126.00
3. Unclassified excavation	58,300 c. y.	.33	.40	.44
4. Drainage ditches	6,500 c. y.	.60	.60	.73
5. Borrow excavation	52,100 c. y.	.35	.40	.44
6. Overhaul, ½-mile, special	10,000 c. y.	.06	.05	.06
7. Subgrade reinforcement	5,000 c. y.	1.00	.50	.73
8. Conc. pavement, 8-in. uniform, 12 and 22-ft. wide	36,880 s. y.	2.80	2.60	2.85
9. Conc. pavement, 8-in. uniform, width to 4 and 8-ft	27,480 s. y.	2.80	2.60	2.80
10. Conc. pavmt., 8-in. uniform, 16-ft. wide	710 s. y.	2.80	4.00	3.80
11. Conc. pavement, 9-in. uniform, width under 4-ft	600 s. y.	3.00	3.00	4.25
12. Class C concrete, headwalls	25 c. y.	30.00	30.00	34.00
13. 18-in. rein. concrete pipe	1,032 l. f.	2.00	2.25	3.00
14. 24-in. rein. concrete pipe	140 l. f.	4.00	3.00	4.00
15. 18-in. rein. conc. pipe exten.	332 l. f.	2.50	2.50	3.00
16. 24-in. rein. conc. pipe exten.	220 l. f.	4.00	3.50	4.50
17. 30-in. rein. conc. pipe exten.	32 l. f.	6.50	6.00	6.00
18. Relaid pipe, 18-in. and under	225 l. f.	1.25	1.00	2.00
19. Relaid pipe, over 18-in.	50 l. f.	2.00	1.50	4.00
20. Shoulder drains	200 c. y.	7.00	5.00	4.00
21. Concrete for inlet	1 c. y.	60.00	40.00	30.00
22. Grating and frame for inlet	1 ea.	25.00	40.00	30.00
23. Reset barbed wire fence	400 l. f.	.025	.02	.025
24. Reset hog-wire fence	5,200 l. f.	.035	.03	.035
25. Reset combination barbed and hog-wire fence	3,600 l. f.	.05	.05	.05
26. Reset other fence	200 l. f.	.06	.05	.10
27. Right-of-way markers	150 ea.	3.00	2.50	2.00

HIGHWAY AND BRIDGE IMPROVEMENTS NEW MEXICO

OWNER: New Mexico State Highway Dept., Santa Fe.

PROJECT: Grading, minor drainage structures, repairing and strengthening existing timber bridges, surfacing, and oil processing 9.001 miles of State Route No. 30 between Espanola and Otowi in Santa Fe and Rio Arriba Counties, New Mexico.

CONDITIONS: Contractor to furnish all materials and complete work in 45 weather working days. Rail and highway transportation facilities available. Wage rates are: skilled labor, 80c to $1.50 per hour; semi-skilled, 60 to 80c.; and common, 45c.

BIDS: Four bids were received November 13, 1943, ranging from the contract low of $87,731 to $107,524.

LIST OF BIDDERS:

1. Martin & Cowart, Albuquerque, N. M. (contract) $87,731
2. A. O. Peabody, Santa Fe, N. M 88,150
3. Lowdermilk Bros., Denver, Colo 91,200
4. Skousen Bros., Albuquerque, N. M 107,524

Items	Quan.	Unit Prices (1)	(2)	(3)
1. Remove old drainage structures	Lump Sum	$1,000.00	$600.00	$700.00
2. Unclassified excavation	21,000 c. y.	.50	.40	.50
3. Rolling (steel-tired roller)	179 hr.	6.00	5.00	7.00
4. Rolling (sheepsfoot roller)	388 hr.	4.00	6.00	5.00
5. Watering (thousand gallons)	354 M gal.	3.00	2.50	3.00
6. Class A concrete	439 c. y.	35.00	40.00	32.00
7. 24-in. plain conc. pipe culv., 4½-in. shell	620 l. f.	6.00	6.00	6.00
8. 30-in. pl. conc. pipe culv., 5½-in. shell	48 l. f.	8.00	7.50	7.00
9. 36-in. pl. conc. pipe culv., 5½-in. shell	140 l. f.	10.00	9.00	8.00
10. Contour ditches	1,900 l. f.	.20	.10	.10
11. Construct and maintain detour road	1.1 mi.	1,000.00	1,000.00	1,000.00
12. Pit run grav. base crse. surf	2,191 c. y.	.80	1.40	1.50
13. Pit run grav. top crse. surf	2,158 c. y.	.80	1.40	1.50
14. Cutback asphalt (MC-3)	4,551 bbl.	5.50	5.00	7.00
15. Mixing oil and aggregate	8.559 mi.	1,000.00	1,400.00	1,000.00
16. Grading	6.830 mi.	1,000.00	600.00	800.00
17. Cl. A conc. substructure (bridge)	58 c. y.	45.00	40.00	55.00
18. Untreated timber substructure	5.116 Mbm.	200.00	160.00	200.00
19. Treated timber piling	784 l. f.	3.00	3.00	4.00

Safety-Plus?

LOOKING FORWARD to the post-war s of your community, are you placing roper emphasis on *more complete* ap- ions of chlorination, so as to extend *-plus* throughout your distribution sys- very day in the year?

DATA, based on actual case histories, tinually being secured on Break-Point ination and other modern application ique for extra safety and for more thor- taste and odor control.

EEP POSTED, check with your local Representative, or write for up-to-the- e information from our Engineering tment.

Only Safe Water is a Sterilized Water"

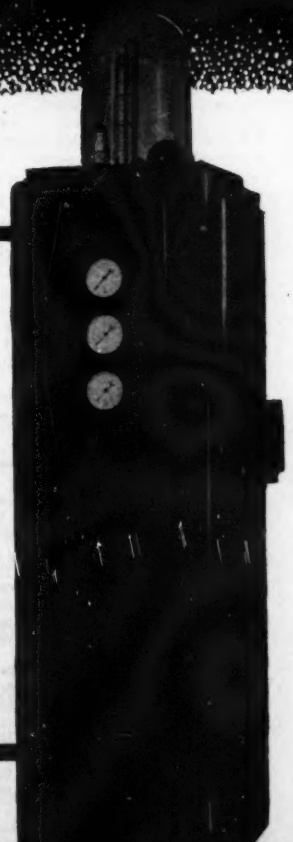
W&T "WATCH" WORDS

Keep your eye on these keys to post-war chlorination progress

BREAK-POINT . . . for greater health protection, plus taste and odor control.

DUPLICATE UNITS . . . for 100% safety-insurance, plus peak load reserve.

FULLY AUTOMATIC CONTROL of application, to maintain a definite residual.



WALLACE & TIERNAN COMPANY, INC.

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

JANUARY CONSTRUCTION material prices and labor rates reveal only minor changes from the preceding month in the twenty cities reporting to *Engineering News-Record*. Douglas fir is 50c. to $1.50 higher on 1- and 2-in. sizes, but $1.50 lower for rough timbers in Minneapolis. Spruce is up $6.00 per M ft. in Montreal. Fir and spruce timbers are $5.00 lower in Boston. Fir piling prices are higher in the New York shipping area.

Minor increases are reported in cement and crushed stone in Cleveland, but paving asphalt reports a decrease of $2.00 per ton in that city. Structural clay building tile is off in Montreal. Vitrified sewer pipe prices decline in New York.

Skilled construction labor and common labor rates remain unchanged from their December levels.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT — Per bbl., C/L lots, incl. 40c. per bbl. for bags, cash dis. not deducted			SAND AND GRAVEL — Per ton, carload lots			CRUSHED STONE — Per ton, carload lots		CRUSHED SLAG — Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK — 8x8x16-in.; truckload del.; per block		CONCRETE — Ready Mixed 1:2:4, cyd.
	Cloth *a*	Paper	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand-grav. Lt. wgt. Agg.		50 c.y. del.
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$0.17	....	$8.00
Baltimore	2.33	2.08	1.88	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	.125	$0.125*w*	7.25
Birmingham	2.50	2.25	2.10	1.75	1.75	1.50	.85	1.00	.90	1.15	.1425	....	5.80
Boston	2.75*b*	2.40*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	.13	.155*w*	7.25*m*
Chicago	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	.16	.16*x*	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	.12	.15*w*	6.60
Cleveland	2.39	2.14	....	....	....	....	1.73*i*	1.73*i*	1.73*i*	1.73*i*	.14	.14	7.30*i*
Dallas	2.52	2.27	2.07	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	.15	....	6.20
Denver	3.08	2.88	2.32	1.20	1.30	1.25	1.65	1.75	1.00	1.00	.15	.15*w*	7.25
Detroit	2.39	2.14	1.99	1.50	1.50	1.50	2.25	2.25	2.00‡	2.00‡	.14	.14*w*	7.00
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	.125	.125*wy*	7.50*n*
Los Angeles	3.00*v*	2.40*v*	....	1.30	1.30	1.15	1.30*f*	1.30*f*	....	....	.04½*b*	.10*aa*	7.25
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	.12	.16	7.40*i*
Montreal	....	1.95*rs*	1.79*rs*	....	1.65‡*t*	2.05‡*t*	1.05*ct*	1.15*ct*	....	....	.14*t*	.14*ct*	7.90*h*
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	.19	....	9.25
New York	2.60‡	2.44‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	.14*cc*	.14*wcc*	7.75*k*
Philadelphia	2.33	2.08	1.88	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	.155	.155*w*	8.25
Pittsburgh	2.45	2.20	2.00	1.65‡	1.65‡	1.85‡	2.25‡	2.25‡	1.50	1.50	.17	.17*z*	8.25
St. Louis	2.80	2.52	....	1.75‡	1.50‡	1 25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	.12	.165*w*	8.00
San Francisco	....*u*	2.21	1.91	1.36	1.36	1.36	1.46	1.46	....	....	....	.20*aa*	7.55
Seattle	2.95*a*	2.75*a*	....	1.00*a*	1.00*a*	1.00*a*	2.00*a*	2.00*a*	....	....	.16	.16*y*	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* F.o.b. quarry. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 2 percent for cash in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u* Price withdrawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag. *w* Cinder. *x* Waylite. *y* Haydite. *z* Celocrete. *aa* Pumice. *bb* 4 x 8 x 12 in. *cc* Also 8 x 18 x 18 in.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn	$1.80	$1.75
Dallas, Tex. (Inc. 9c. tax)	1.84	1.79	Limedale, Ind	1.70	1.65	Steelton, Minn	1.80	1.75
Hannibal, Mo	1.70	1.65	Norfolk, Va	1.75	1.70	Universal, Pa	1.65	1.60
Hudson, N. Y	1.75	1.70	Northampton, Pa	1.55	1.50	Waco, Tex. (Plus 9c. tax in Tex.)	1.75	1.70
Independence, Kans	1.70	1.65	North Birmingham, Ala	1.70	1.65	Montreal (8% sales tax incl.)	1.68	1.62
						Discount 10c. per bbl. 20 days		

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICK AND BLOCK — Granite per M. lots of 50,000	Brick per M 3x4x8½ in.	Wood per sq. yd. 3½ in.	PAVING ASPHALT — Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES — Per gal., 80–300 penetration		CUTBACK ASPHALT — Per ton		ROAD OIL — Per gal.	ASPHALT EMULSION (Quick-breaking) — Per gal.	
	4x4x8 in.	carload lots	16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.53*e*	$24.62*e*	$0.0740*e*	$0.1300*e*	$0.0802*he*	$0.1348*h*	$0.0676*e*	$0.0826	$0.1386
Baltimore	150.00‡	48.00	80.00*m*	15.00*r*	21.00*r*	.06*r*	.09*r*	13.00*r*	23.00*r*	.065*r*	.07*r*	.10*r*
Birmingham	150.00	48.00	.....	17.95	.....†	.0747	.....†	.0834*h*	.....†	.065	.09	.....†
Boston	80.00	57.00	3.75	14.20	20.00	.06	.09	.065*h*	.....	.....	.....	.....
Chicago	150.00	55.00	1.80/2.00*d*	14.00	22.50	13.00*y*	21.50*y*	.0575*h*	.15*h*	.05*n*	.09/10*n*	.13/.15
Cincinnati	120.00	50.00	.....	16.40	.....	.085	.....	12.25	.....	.07	.085	.....
Cleveland	118.00	37.50	2.50	17.00	19.00	.085	.095	.10*h*	.15	.095	.09	.095
Dallas	.....	36.00	.....	13.65	20.30	.06	.11	16.00	24.80	.06	.05/.07	.07/.09
Denver	.....	66.11	.....	11.00	.....	10.00	.....	.045*h*	.....	.....	.....	.....
Detroit	.....	37.50	.....	18.06*f*	25.60*f*	.0743	.128	.0718*h*	.119*h*	.067	.0775	.110
Kansas City	.....	40.00	.....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	.....	50.00	.....	9.00*b*	23.00	9.50*bg*	24.00*bg*	9.50*b*	.....	.025	.072	.15
Minneapolis	.....	.....	2.30*d*	.....	27.70	.....	.126	.....	32.64	.....	.....	.....
Montreal	92.40	.....	.....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.180
New Orleans	.....	.....	.....	13.50*a*	20.00*a*	.057	.068	.06*h*	.095*h*	.....	.080	.....
New York	.....	70.00	.....	17.40	24.20*p*	14.00	.....	.0725*h*	.1325*hp*	.....	.0725*p*	.1225
Philadelphia	140.00	58.00	4.05	15.00*r*	.....	14.00*r*	.....	.065*hr*	.....	.....	14.00*pr*	.....
Pittsburgh	135.00	38.75	.....	18.00	23.00	.09	.16	20.00	36.00	.07	.06	.11
St. Louis	.....	37.00	.....	16.00	22.00	15.00*g*	21.00*g*	.0575*h*	.1213*h*	.048	.0525	.1125
San Francisco	.....	40.00	.....	10.90	21.15	10.90*gr*	18.00*gr*	12.90	17.50*r*	9.50*gr*	.0525	.1125
Seattle	.....	60.00*c*	.....	10.90*i*	23.40*i*	.....	20.40*pi*	11.40*i*	.....	.....	.0525*i*	.0825

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martines. *j* 3x3½x8½ in. *k* Tax included. *m* M thousand. † Available on priority only and quoted specially. *p* No steel dr shipments except to armed forces. *r* February 1943 prices, none later avail

15%-30% more production with the WILSON "BUMBLEBEE"

Here's why the Wilson AC welding machine is boosting welding output by 15% to 30% in many metal-working plants. The "Bumblebee" puts a real sting into the arc – makes it deep and penetrating and almost wholly free of "arc blow". As a result welding output is notably increased while weld quality is considerably improved.

In addition, the "Bumblebee" reduces power costs – using 30% to 35% less power to do the same amount of work as an equivalent DC machine. Built-in capacitors provide improved power factor, which helps to reduce power bills, and permits operation of more welders from existing shop lines without causing overload. Maintenance, too, is easier because the "Bumblebee" has no heavy rotating parts.

The Wilson "Bumblebee" is made in 300 and 500 ampere capacities. Special running gear assembly can be supplied (at slight extra cost) where portability is desired. The "Bumblebee" is also made in "All-Weather" models which have extra moisture protection throughout, as well as automatic low open-circuit voltage controls.

Other Wilson AC welders are available in sizes from 100 to 1000 amperes capacity. There is a complete line of Wilson AC electrodes for every AC welding requirement.

WILSON

WILSON WELDER and METALS CO., INC.

General Offices: 60 East 42nd Street, New York 17, N. Y.

the U.S.A. WILSON AC WELDERS — *distributed through the Air Reduction Sales Company*

Canada: G. D. Peters & Co. of Canada Limited • Birks Bldg. Montreal

SEND FOR *FREE* CATALOG

WILSON WELDER AND METALS CO., INC.
Department 1656 ENR
60 East 42nd Street, New York 17, N. Y.

Please send me Catalog ADW-53 giving full details on the WILSON "BUMBLEBEE".

NAME_____

COMPANY_____

ADDRESS_____

CITY & STATE_____

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¼-in billet *b*	RIVETS ½-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *e*	Tie Plates *e*	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	3.05	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per cl.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¼ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq. yd., carload lots Std. diamond mesh, 3.4 lb	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 sq.yd., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.40	$2.40	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	.....	.10	22.50	24.50	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	....
Boston	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53*cd*	2.53*cd*	.....	.05	19.50	21.50	1.66	1.25	.1566	....
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	....
Dallas	4.25	3.17	3.17	.....	....	25.00	27.50	1.93	1.42	.1827	....
Denver	4.37	4.842	3.85	.....	....	26.50	26.50	1.97	1.45	.186	....
Detroit	3.65‡	2.52‡	2.52‡	.....	.10	30.00	30.00	1.68	1.26	.1584	2.80
Kansas City	4.19	2.61*cd*	2.61*cd*	.0	.05	24.50	26.50	1.78	1.33	.1683	3.14
Los Angeles	3.65*f*	2.575	2.425	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.41
Minneapolis	3.81‡	2.73	2.73	.0	.10	25.00	27.00	1.80	1.34	.1701	2.73
Montreal	4.00*i*	2.90*i*	2.80*i*	.....	....	26.00*hij*	33.00*hij*	2.25*i*	3.14*i*	.1228*i*	....
New Orleans	4.229‡*k*	2.82	2.82	.05	.10	19.00	21.00	1.82	1.35	.1715	2.871
New York	3.75	2.76*e*	2.76*e*	.....	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.66	3.82	....	.....	....	19.50	21.50	1.71	1.28	.1611	2.72
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.49
St. Louis	3.697	2.74	2.74	.0	.05	28.00	34.00	1.69	1.27	.1602	2.70
San Francisco	4.35	2.825	2.675	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.03
Seattle	2.75*e*	2.80*e*	....	.....	....	34.50	38.50	1.93	1.42	.1827	2.94*gj*

‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* Fab. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between rail billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *j* August 1942 price; not on market. *k* Quotation on changed basis; no actual price change.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	Delivered std. 12 in., s.s.	ASTM 24 in.,	C13-35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14-35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6 in.; Lap Weld Black %	Galv. %
Atlanta	$49.66	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	53.00	.35	.60	2.65	7.25	160.00	200.00	.50	1.75	65.5	57.5	63.0	54.5
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	55.40	.26	.463	2.07	5.85	.....	.....	.60	.....	....	....	....	....
Chicago	54.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	53.0
Cincinnati	53.27	.231	.445*b*	1.80	5.125	105.00	170.00	.60	1.70	57.1	45.4	54.0	39.6
Cleveland	54.75	....	....	....	.....	.....	.....	....	1.60	68.5	57.5	66.0	54.5
Dallas	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	61.56	.29†	.52†	2.16†	3.00*n*	125.00	200.00	1.00	2.22	58.4	50.4	55.7	47.3
Detroit	54.75	.35	.675	2.70	7.75	135.00	.....	.40	1.75	57.7	44.0	54.8	40.8
Kansas City	55.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	35.9	46.4	46.6	39.5
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	61.1	50.1	58.6	47.1
Minneapolis	59.00	.275†	.495†	1.98†	5.37†	.....	.....	.90	2.10	64.2	53.2	60.7	49.2
Montreal	67.00	.85*o*	1.50*o*	5.25*p*	8.50*ep*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....
New Orleans	51.78	.26	.48	1.69	.....	150.00	220.00	.45	1.65	62.4	54.4	58.8	50.3
New York	52.40	.308	.594	2.52	6.45	.....	.....	.60	1.40	64.9	53.9	62.4	50.9
Philadelphia	51.00	.30	.58	2.50	7.50	150.00	225.00	.45	1.75	56.6	42.8	53.6	39.1
Pittsburgh	56.00	.245†	.4725†	1.845†	5.4325	97.80	154.20	.35*g*	2.00*g*	65.5*i*	57.5*i*	66.0*i*	54.5*i*
St. Louis	53.62	.28	.504	2.016	4.50	85.00	220.00	1.00*j*	2.15*k*	56.4	42.6	52.5	38.4
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.00	192.50	.58	2.34	45.0	31.0	41.0	26.9
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	.....

‡ Delivered. †F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.; ¾ in., 8½c.; 1 in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. 3 percent tax on transporation costs not included. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76-37. *k* Reinforced; spec. C 75-37. *l* Plus sales tax. *m* Tax included. *n* 27-in. pipe. *o* Less 50%. *p* Less 53%.

Built to set the pace

and HOLD IT!

After more than a decade of duty in all types of construction equipment on the kind of jobs that really put power "through the wringer"—this fact about Cummins Dependable Diesels stands out like an unbroken window in Berlin: They are built to set the pace in dependability, economy and speed —*and hold it!* Day and night . . . until the job is wrapped up and delivered.

CUMMINS ENGINE COMPANY

Columbus, Indiana

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face) *All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)*									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base price)	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	¼"	⅜"
Atlanta	$37.00	$37.00	$32.00	$31.00	$31.00	$34.50	$49.00	.....	.....	$58.00	$66.00	$17.90	$21.85
Baltimore	42.00	45.00	42.00	42.00	43.00	48.00	65.00	.....	.....	115.00	120.00	18.25	22.25
	48.00	*48.00*	*55.00*	*55.00*	*55.00*	*56.00*	*68.00*	*$70.00*	*$70.00*	.....	.....	.....	.....
Birmingham	34.50	36.50	32.00	32.00	34.00	34.00	53.00	53.00	56.00	.....	.....	17.35	21.15
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	.....	.....	67.50	70.00	.....	.....
Boston ‡*	42.00[3]	45.00[3]	55.00[3]	60.00[3]	60.00[3]	65.00[3]	70.00[3]	.....	.....	75.00[3]	75.00	18.25	22.25
‡*	*50.00*	*50.00*	*55.00*	*60.00*	*65.00*	*65.00*	*75.00*	*75.00*	*75.00*	.....	.....	.....	.....
Chicago	50.00	51.00	50.00	49.00	50.00	54.00	67.00	.....	.....	80.00[3]	95.00[3]	14.60	17.80
	50.00	*50.00*	*47.50*	*47.00*	*47.00*	*48.00*	*57.00*	*56.00*	*53.00*	.....	.....	.....	.....
Cincinnati	41.00	42.50	39.00	40.50	42.00	43.00	53.00	.....	.....	65.00	68.00	17.35	21.15
	.....	.....	.....	.....	.....	.....	*55.50*	*55.50*	*55.50*	.....	.....	.....	.....
Cleveland	42.50[k]	42.50[k]	52.50[k]	51.00[k]	65.00	65.00	83.00	83.00	83.00	.....	.....	17.75	21.60
Dallas e	44.25	44.25	41.50	40.00	40.00	42.00	57.50	55.50	55.00	83.50	80.50	14.60	17.80
Denver ‡	64.00[3]	62.00[3]	65.00[3]	65.00[3]	65.00[3]	66.00[3]	60.00[3]	*88.00*	*89.00*	.....	.....	10.45	12.70
Detroit	61.00	61.00	57.75	57.75	57.75	62.75	72.75	.....	90.00	70.75	90.00	17.35	21.15
	57.00	*57.00*	*57.00*	*57.00*	*62.75*	*63.75*	*71.00*	*75.00*	*75.00*	.....	.....	.....	.....
Kansas City a	64.00	64.00	62.00	60.50	62.00	64.00	79.00	.....	.....	79.00	89.00	12.60	15.40
	60.00	*60.00*	*58.00*	*58.00*	*58.00*	*58.00*	*75.00*	*80.00*	*80.00*	.....	.....	.....	.....
Los Angeles a	*58.50*	*58.50*	*58.50*	*59.00*	*60.25*	*60.25*	*75.75*	*74.25*	*74.25*	.....	.....	9.90[gh]	12.05[gh]
Minneapolis ‡b	59.00[3]	59.00[3]	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.60	15.40
‡	*56.00*	*56.00*	*55.75*	*56.00*	*58.50*	*56.25*	*63.25*	*62.00*	*62.00*	.....	.....	.....	.....
Montreal †[j]	*58.00*	*61.00*	*54.00*	*58.00*	*60.00*	*66.00*	.....	.....	.....	200.00	200.00	.....	.....
	48.50	*48.50*	*45.25*	*45.25*	*45.25*	*48.75*	*50.00*	*50.00*	*50.00*	.....	.....	.....	.....
New Orleans	37.50	37.50	32.50	31.50	31.50	35.00	46.00	.....	.....	52.50	69.00	14.60	17.80
	51.00	*51.00*	*35.00*	*51.00*	*54.00*	*58.00*	*58.00*	.....	.....	.....	.....	.....	.....
New York	60.50	61.50	56.25	55.25	56.25	59.50	67.50	.....	.....	120.00[f]	125.00[f]	18.35	22.25
‡	.....	.....	*65.00[i]*	*63.00[i]*	*65.00[i]*	*65.00[i]*	[Range from $75 to $95]			.....	.....	.....	.....
Philadelphia	45.00	43.00	42.00	41.00	41.00	44.00	64.00	.....	.....	126.00	122.00	18.25	22.25
	[*$70.00* to *$55.00*]			*75.00*	*75.00*	*75.00*	*75.00*	*77.50*	*$85 to $105*	*$85 to $105*	.....	.....	.....
Pittsburgh	50.80	53.20	42.75	45.00	46.85	62.50	76.25	.....	.....	.....	.....	18.10	22.05
	69.80	*68.10*	*66.10*	*65.80*	*65.80*	*65.65*	*88.75*	*88.75*	*88.75*	.....	.....	.....	.....
St. Louis ‡e	56.00	56.00	53.00	52.00	53.00	56.00	69.00	*75.00*	*75.00*	86.00	85.00	14.60	17.80
San Francisco d	*56.00*	*56.00*	*54.00*	*54.00*	*53.25*	*53.25*	*59.00*	*59.25*	*59.75*	.....	.....	7.30[g]	8.90[g]
Seattle	*55.00*	*55.00*	*55.00*	*55.00*	*55.00*	*55.00*	*40.00*	*40.00*	*40.00*	.....	.....	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [5] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. Seattle base price on ¾", $95.15; on ¼", $104.85; price includes oiling and sanding charges. For other centers add rail freight increment from table or price size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $69. *j* Average price. *k* August price. *l* September price; none later available.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness A quality	B quality	EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*	
Atlanta	75%	75%	$0.15	
Baltimore	78%	79%	.15	
Birmingham	76%	76%	.105	
Boston	77%	78%	.15	
Chicago	77%	77%	.15	
Cincinnati	77–10%	77–10%	.15	
Cleveland	77–10%	77–10%	.19	
Dallas	76%	76%	.1625	
Denver	76%	76%	.155*e*	
Detroit	77%	77%	.1575	
Kansas City	77–10%	77–10%	.155	
Los Angeles	86%*d*	88%*d*	.1575	
Minneapolis	77%	77%	.155	
Montreal	40–10–5*ab*	40–10–10*ac*	.1675†	
New Orleans	70%	75%	.16	
New York	81%	82%	.22*f*	
Philadelphia	78%	79%	.15	
Pittsburgh	79%	79%	.1225	
St. Louis	77–10%	77–10%	.155	
San Francisco	66%	73%	.155	
Seattle	75%	75%	.1575†	

Price of 60% Ammonia Gelatin is $0.01 per lb. higher than 40%

a Discount from list Sept. 1939; sales tax included, but 6% tax exemption not allowed for. *b* Single thickness. *c* Double thickness. *d* Discount from jobbers' list Sept. 15, 1928.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal St. add delivery charge of $6.00 per trip † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine.	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1325‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, fir and pine, bark on, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight to Norfolk.

Dimensions	Points	Length	By Rail— Pine	Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.33	...
12-in.— 2-ft. from butt	6-in.	50 to 59-ft.	.34	...
12-in.— 2-ft. from butt	6-in.	60 to 69-ft.	.35	...
12-in.— 2-ft. from butt	6-in.	90 to 100-ft.	....	.33
13-in.— 3-ft. from butt	5-in.	91 to 100-ft.	....	.34
14-in.— 2-ft. from butt	6-in.	50 to 69-ft.	.40	.40
14-in.— 2-ft. from butt	6-in.	70 to 79-ft.	.41	.57
14-in.— 2-ft. from butt	5-in.	80 to 85-ft.	.52	...
14-in.— 2-ft. from butt	5-in.	85 to 89-ft.	.55	...
14-in.— 2-ft. from butt	5-in.	90 to 100-ft.	....	.59

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8' Untr.	7"x9"x8' Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	2.50	$3.50
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.88
	Mixed Oak	1.71	2.59	2.42	3.88
Birmingham	White Oak	1.00	1.60*a*	1.30	2.56
Chicago	Red Oak	....	2.10*a*	....	2.87
Los Angeles	Douglas Fir	1.10	1.75*a*	1.60	2.50
Philadelphia	Red Oak	....	2.10*ag*	....	3.50
St. Louis	White Oak	1.48	....	2.04	....
	Red Oak	1.48	2.05*a*	2.04	3.00
	Sap Pine or Cypress	1.55	....	1.91	....
San Francisco	Douglas Fir	1.25*bf*	....	....	3.00
Montreal	Birch or Maple	.85	.95	....†	....

Tr.— Treated; Untr.— Untreated. *a* Creosoted *b* 6"x8"x8'6". *c* Zinc-cell. *d* Zinc. *e* Green. *f* F.o.b. cars. † Out of market. *g* January 1943 price; none later available.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.50–3.00
Chlorine cylinders, liquid, per lb. delivered	.10
Calcium chloride, 77–80%, flaked, 100-lb. paper bag, del'd, ton	18.00–30.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb	1.50
Soda ash, 58%, in paper bags, per 100 lb. dense	1.60
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00–30.00
Sulphate of copper, in bbl., per 100-lb	6.00

NEWS OF THE WEEK

(Continued from p. 57)

Big airport program predicted for after war

A postwar airport construction program of $800,000,000 was forecast by William A. M. Burden, special aviation assistant to the Secretary of Commerce, in a recent address before the First National Clinic of Domestic Aviation Planning at Oklahoma City, Okla. This would double the present investment in airports in this country. He added that the provision of adequate facilities for private flying is the primary postwar airport problem.

"Our plans, though not complete, indicate the need for an additional 1,900 small fields for the private flier," he said. "The majority of these will probably be required in densely populated urban areas and the remainder distributed throughout the country.

"Postwar airport requirements cannot be foreseen in detail," Mr. Burden said, "but they fall generally into four categories: (1) development of large airports for transcontinental and transoceanic operations; (2) development of existing designated air-carrier airports; (3) development of facilities for local or feeder scheduled service; and (4) development of facilities for the private flier.

"The development of large airports for transcontinental one or two stop service and for transoceanic operation are specialized problems and apply only to a comparatively few areas. At these key airports it is believed desirable that the development provide ultimately for the extension of some of the runways to 7,000-ft. sea-level length. If wing loadings and power loadings continue their upward march, even longer runways may be desirable for long-range operation. Many airports of our present air transport network are deficient in some respects with the result that the carriers have to operate into these fields under limitations. If at all possible, these fields should be improved sufficiently to remove the operational limitations and runways with effective lengths of 5,000 ft. at sea level provided.

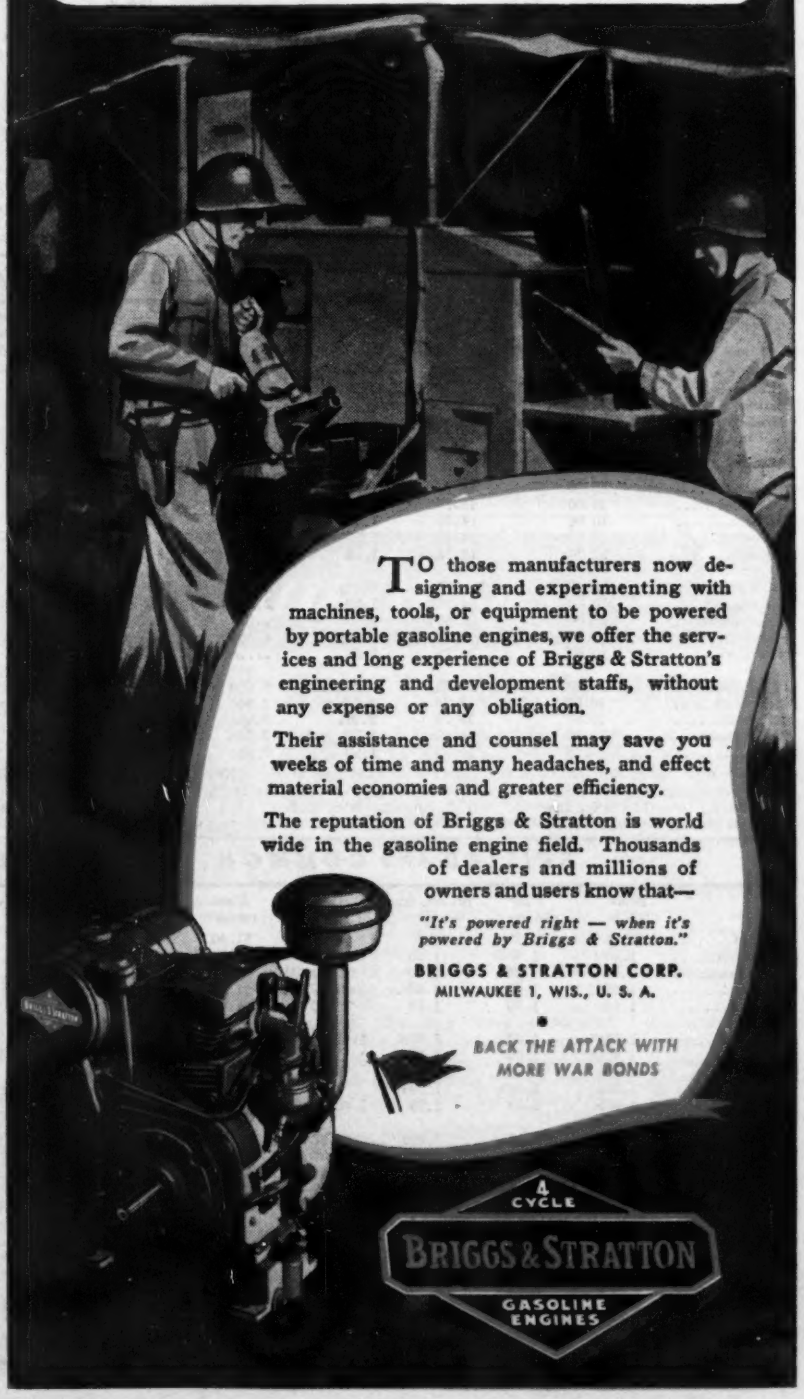
New facilities needed

"The development of local air service will also require an improvement of existing airport facilities and the construction of some new facilities. The Civil Aeronautics Administration has estimated in connection with the recent hearings held before the Civil Aeronautics Board that some 600 locations

A Mobile Service...

FOR ANY GUN — PISTOL TO HOWITZER

"Keep 'em Firing"—no matter where they are. That's the slogan. Repair crews, with their mobile workshops, service all types of guns, from pistols to howitzers. Generating units, powered by gasoline engines, charge batteries and operate electric drills and other modern tools. This is typical of the multitude of vital jobs — both standard and special — for hundreds of thousands of rugged, dependable Briggs & Stratton engines "in the service."



TO those manufacturers now designing and experimenting with machines, tools, or equipment to be powered by portable gasoline engines, we offer the services and long experience of Briggs & Stratton's engineering and development staffs, without any expense or any obligation.

Their assistance and counsel may save you weeks of time and many headaches, and effect material economies and greater efficiency.

The reputation of Briggs & Stratton is world wide in the gasoline engine field. Thousands of dealers and millions of owners and users know that—

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MILWAUKEE 1, WIS., U. S. A.

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BACK THE ATTACK WITH MORE WAR BONDS

4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE—PARTITION—SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE—LOAD BEARING—SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity. Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper: Common hydrated	Carload lot, Pulverized, or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.04	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	320.00	15.90k	19.00k	18.00	13.00	2.50m
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25o
Boston	89.35a	93.30a	178.70a	202.50	271.80	308.70	16.50i	19.50i	17.50†	12.50†	14.92†
Chicago	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.50
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	22.00	22.00	15.50	13.00	.....
Cleveland	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	15.75j	13.25j	3.00m
Dallas	62.50	67.50	135.00	162.00	212.50	263.00	13.50i	15.00i	19.00	15.00	15.00
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	18.00	25.00j	17.00j	20.00j
Detroit	.....	.....	.....	.....	.....	.....	20.00	21.00	18.00	16.00	16.00
Kansas City	67.00	69.00	89.00e	128.00	163.00	189.00	15.50	16.50	19.32	13.00	10.92
Los Angeles	73.50†r	89.50†r	128.00e†r	210.00†r	368.00†r	460.00†r	13.50	15.00	16.50	17.50	17.50
Minneapolis	81.95b	87.40b	148.70b	.....	179.30b	249.35b	13.60	15.60g	21.00	16.00	19.00
Montreal	94.55a	100.45a	199.50a	160.45a	109.40a‡	137.40a‡	21.08†u	28.35†u	24.60u	18.00u	.....
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00e	193.30h	238.80h	295.60h	16.50/17.50	.....	20.00	14.00	17.00
Philadelphia	85.30	91.00	170.50	186.30	235.00	261.10	17.00	20.00	19.00	13.00	15.00
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55m
St. Louis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	2.50m
San Francisco	96.00	108.00	144.00	.....	.....	.....	19.00	.....	24.00	23.00	2.50m
Seattle	115.00	125.00	230.00	.....	.....	.....	20.00/	21.00/	20.00s	20.00s	20.00o

† F.o.b. a Smooth. b Carload lots delivered to job. c 6x12x12 in. d Not load bearing. e 48 lb. tile. f Less $1.00, ½ cash 15 days, balance 30 days. g Selected common. h F.o.b. Perth Amboy, N. J. i F.o.b. Warehouse only. j LCL. k $1.00 discount if paid in 10 days. l Lump. m Per bbl., 180 lb. o Per bbl., 200 lb. p 280 lb. bag. r 5% discount 10 days. s 2% discount for cash. t 5½x8x12. u 8% sales tax included. v 6x12x12-in.

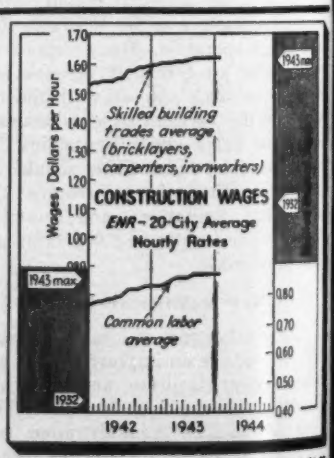
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry a	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum b	Ferric Oxide d	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
Birmingham	10.25	14.125	2.35	3.50r	1.98r	2.04	1.97	1.97	.32	28.35
Boston	10.00	13.75	1.65	....	2.30	2.10‡	1.65h‡	1.65h‡	.50‡	21.00‡
Chicago	10.00	13.75	....	....	....	1.75h/	1.74h/	1.82h/	.33/	23.00/
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39h	2.39h	.36	21.00
Cleveland	10.00	13.75	1.70	2.90	1.60	1.93	1.83h	1.83h	.35	29.00
Dallas	10.00	14.50	1.88	2.11m	.05l	1.75h	1.66h	1.66h	.35	39.00
Denver	10.50	14.25	1.65	14.25h	.27l	2.45	3.15	3.15	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.25	2.25	2.25	.50	23.00
Kansas City	10.00	13.875	2.39g	2.55gr	2.16g	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.75i	1.66hi	1.66hi	.32	23.00
Montreal	9.25	6.25	2.50p	4.90p	3.15p	2.67	2.47	2.07	.94	1.85i
New York	10.00	13.75	2.03	....r	1.64	1.66	1.58h	1.58h	.26	25.00
Philadelphia	10.00	13.75	1.60/1.80	2.20r	1.55	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.94h	1.94h	.34	26.00
St. Louis	10.00	13.75	2.28s	2.89s	1.96s	1.66	1.66	1.66	.28	23.00
San Francisco	10.25	14.00	1.80	2.75n	1.35	1.71	2.40	2.40	.33	20.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16h	....	.35	26.50j

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. a Red lead prices change frequently due to pig lead price changes. b U. S. War Dept. Spec. 3-49A. c ASTM Spec. D266-31. d 80% minimum ferric oxide. e Subject to 25% discount. Distributors' price to contractors. g 5 gal. can. h Per roll, 65 lb. i Minneapolis and vicinity. j Asphalt pitch. k Per 100 lb. l Per lb. m Per bbl. n May, 1941 price, no later quotation available. p Plus 8% sales tax. r Not available, except on priority rating; then quoted specially. s December, 1942 price.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.50	$1.25	$1.50	$1.25	$1.50	$0.40	$0.50
Baltimore	1.75	1.375	1.80	1.625/1.80	1.50	.75	.75
Birmingham	1.75	1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.675	1.45/1.60	1.625	.85	.85
Cleveland	1.875c	1.55	1.75	1.75	1.75	1.00/1.25	1.00/1.25
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65b	1.50b	1.50b	1.50b	1.65b	.80b	.80b
Detroit	1.675	1.50	1.75	1.625/1.75	1.675	.90	.90
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.90
Los Angeles	1.50	1.35	1.625	1.375	1.667	.875	.875
Minneapolis	1.50	1.375	1.50	1.40	1.50e	.925	.925
New Orleans	1.50	1.25	1.50	1.50	1.375	.65	.75
New York	2.00b	1.85b	2.00	2.00b	2.00b	1.031	.95
Philadelphia	1.90	1.50	1.90	2.00	2.00	.825	.825
Pittsburgh	1.90	1.75	1.75	1.8125	1.875	.90	.80
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.875	1.50	1.75	1.50/1.75	1.75	.85	.95
Seattle	1.75	1.45	1.68	2.00	1.75	1.05	1.10
Montreal/	.93	.81	.90	.76	.90	.46	.53



ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) $1.67
ENR Common Average: $0.869

b 7 hr. day. c Prevailing rate on government work. e 35 hr. wk. f Effective Nov. 15, 35c weekly bonus added to these rates.

might be expected to receive this type of service. The majority of these locations need some further development of their facilities. It is not proposed that this type of service will require the same runway lengths that are necessary for the operation of existing transport aircraft and it is anticipated the 3,000 ft. effective landing length will be sufficient."

• • •

So. California cities enjoined on sewer plant

Legal action to compel Los Angeles, Calif., and nine adjacent cities and towns to replace the outmoded and inadequate Hyperion sewage disposal plant with a modern treatment works to insure the safe and sanitary disposal of sewage from that heavily populated area was resorted to by the state's attorney general, Robert W. Kenney, with the filing of an injunction suit in Los Angeles Superior Court.

The attorney general's request that the court order the defendants to "plan, finance, construct, operate and maintain sewage treatment works, pipes and conduits for the sanitary disposal of sewage" was without precedent on the West Coast, at least, in that no application is even on file with the War Production Board for any of the critical materials that would be required.

Recalling that the State Board of Public Health revoked Los Angeles' permit to operate the plant on May 18, 1942, a revocation that has gone unheeded, the suit asks that the city of Los Angeles be assessed $1000 a day damages for all the time the plant has been operated without a permit.

The action alleges that in recent years the plant has been carrying a load far beyond its capacity and consequently the screening devices have failed to the point that great volumes of solid matter are now dumped into the sea, polluting all of the Santa Monica Bay beaches.

Other defendant cities named in the action are Alhambra, Beverly Hills, Burbank, Culver City, El Segundo, Glendale, Santa Monica, South Pasadena and Vernon.

• • •

Friant-Kern canal plan rejected by authority

Revised plans of the Reclamation Bureau for early construction of California's 160-mi. Friant-Kern canal, on the assumption that it would add more than 1,000,000 tons of farm products to the nation's war and postwar larder by bringing approximately 200,000 acres of

QUIMBY PUMPS

SCREW
ROTEX
CENTRIFUGAL
CHEMICAL

√ LESS FRICTION
√ LESS WEAR
√ LESS MAINTENANCE
IT ALL ADDS UP TO . . .
Longer Life!

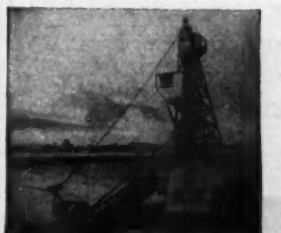
PORTER Better Built Equipment

QUIMBY VERTICAL SCREW PUMP

QUIMBY PUMP COMPANY
INCORPORATED
Division of H. K. PORTER COMPANY, Inc.
PITTSBURGH, PENNSYLVANIA
FACTORIES:
PITTSBURGH, PA. NEWARK, N.J.
MARSHALL, PA. NEW BRUNSWICK, N.J.

Big Savings

Sauerman Slackline Cableway dumping spoil from deep excavation onto high pile.



Sauerman Tower Excavator shown above offers large capacity in loading materials from pit or storage pile into cars or other conveyance.

When You Handle Materials the SAUERMAN Way . . .

More and more contractors are finding out that by using a SAUERMAN Scraper or Cableway they cut the cost of long haul material-handling work and at the same time reduce their labor problems.

A SAUERMAN machine can operate on a lake shore or in a river, on mushy ground, on a hillside, or in a rough pit. The bucket will penetrate the hardest packed material, gather a heaping load quickly, then haul its load at high speed to a bin, hopper or storage pile.

Digging, hauling and automatic dumping are merged into a continuous operation controlled by one operator. Power requirement is moderate. Maintenance is simple because the wearing parts are few and easily accessible.

The sizes of SAUERMAN machines range from a light, portable unit with a ½ cu. yd. bucket operating on a 200-ft. span, rated to handle 20 cu. yd. per hour, up to a powerful machine which hauls a 15 cu. yd. bucket back and forth at an average speed of 400 feet per minute.

Write for Catalog

SAUERMAN BROS., Inc.
532 S. CLINTON ST., CHICAGO 7, ILLINOIS

WOOD Is Still Best For Jobs Like This

THE RAILROADS are among the earliest and most consistent users of Wolmanized Lumber*. Bridge timbers, stringers and ties, wharf and platform decking—life is tough on jobs like these. But this wood is "alloyed for endurance," armed against decay and termite attack, so it can take it.

RESILIENCE, the cushioning effect between trackbed and supporting steel, is retained where Wolmanized Lumber is used in structures like that illustrated above. This wood also offers light weight, ease of handling and erection, high strength. It is clean, odorless, paintable. There is no added fire hazard, and the wood is not corroded by brine drippings from refrigerator cars. Nor does it corrode its metal fittings.

SERVICE RECORDS covering millions of feet of Wolmanized Lumber, at work for the railroads and elsewhere in industry, provide evidence of its durability. Lasting ability is given ordinary wood by vacuum-pressure impregnation with Wolman Salts* preservative. "Fibre fixation" prevents leaching out.

WOLMANIZED LUMBER is being employed for wartime structures all over the world, speeding erection, assuring long life. It will do the same for your peacetime construction. American Lumber & Treating Company, 1649 McCormick Building, Chicago, Ill.

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Alloyed FOR ENDURANCE

WOLMANIZED LUMBER

land under irrigation, were rejected in late December by the Production Urgency Committee for the San Francisco area.

The committee, in denying the proposal, held that the probable wartime benefits to be derived from the completed project would not justify the huge expenditures of manpower, automotive equipment and essential materials that would be required in building the canal.

The Reclamation Bureau had estimated that with 2,000 workers available, the canal, exclusive of laterals, could be finished in two years provided the War Production Board cooperated by extending priorities for essential materials. In a specially prepared report submitted to the Production Urgency Committee, the bureau contended that recent studies indicated a sufficient supply of labor is available to build the project, and the bureau offered to cooperate in the conservation of critical materials by redesigning bridges, culverts and other necessary structures to the extent that only 12,000 tons of the less critical types of steel would be required.

Members of the Production Urgency Committee refused, however, to accept the bureau's estimates as conclusive, pointing to reports in their files which estimated that from five to 10 years would be required to build the project, including laterals.

• • •

Utah no longer opposes Arizona's water claim

Announcement of withdrawal of Utah's objections to a contract for Arizona's participation in the Colorado River compact and of plans to submit the contract to Washington for final approval was made in Denver in December by Judge Clifford H. Stone, chairman of the Colorado River Committee.

The contract was approved by all of the Colorado Basin states, with the exception of Utah and California, at a meeting in Denver on Oct. 20. In the event the plan is approved by Interior Secretary Harold Ickes, the contract would become effective upon its ratification by the Arizona Legislature. Governor Sidney P. Osborn has already signified his readiness to call a special session of the legislature for the express purpose of taking such action.

States included in the compact are California, Utah, Nevada, Wyoming, Colorado and New Mexico. Under the terms of the contract Arizona would receive as much as 2,800,000 acre-ft. of water annually from the Colorado, plus one-half of the surplus unapportioned by the Colorado River Compact, less 1/25 of the surplus to Nevada.

Reports and Pamphlets

(*Continued from page 96*)

WOOD AS AN ENGINEERING MATERIAL—By L. J. Markwardt. American Society for Testing Materials, Philadelphia, 2, Pa. $1.

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TRANSPORTATION AND THE PUBLIC WELFARE IN WAR AND IN PEACE—By Harry E. Stocker. National Highway Users Conference, Washington, D. C.

RAMMED EARTH BUILDING CONSTRUCTION—By H. E. Glenn. Bulletin No. 3. Clemson Agricultural College, Clemson, S. C.

LABORATORY INVESTIGATIONS ON BED-LOAD TRANSPORTATION AND BED ROUGHNESS—By J. W. Johnson. Sedimentation Section, Office of Research, Soil Conservation Service, U. S. Department of Agriculture, Washington, D. C.

DESIGN OF RIGID FRAME KNEES—American Institute of Steel Construction, 101 Park Ave., New York. 75c.

THE EVOLUTION OF A "UNIFORM ROAD TRAFFIC CONTROL CODE WITH SAFETY RULES FOR PEDESTRIANS"—The Eno Foundation for Highway Traffic Control, Saugatuck, Conn.

TESTS OF COMPOSITE TIMBER AND CONCRETE BEAMS—By Frank E. Richart and Clarence B. Williams, Jr. University of Illinois Bulletin Series No. 343, Urbana, Ill. 70c.

TIRE WEAR AND TIRE FAILURES ON VARIOUS ROAD SURFACES—By R. A. Moyer. Public Roads Administration, Federal Works Agency, Washington, D. C.

PROCEEDINGS OF THE TWENTY-NINTH ANNUAL ROAD SCHOOL—Extension series No. 55, Engineering Extension Dept., Purdue University, Lafayette, Ind.

HOW TO PREPARE YOUR 1943 DECLARATION OF ESTIMATED TAX—Prentice-Hall, Inc., 70 Fifth Ave., New York.

PLAN POSTWAR JOBS NOW—Committee for Economic Development, 3311 Department of Commerce Bldg., Washington, D. C.

PROCEEDINGS OF THE SECOND HYDRAULICS CONFERENCE—Bulletin 27, State University of Iowa, Iowa City, Iowa. $1.65.

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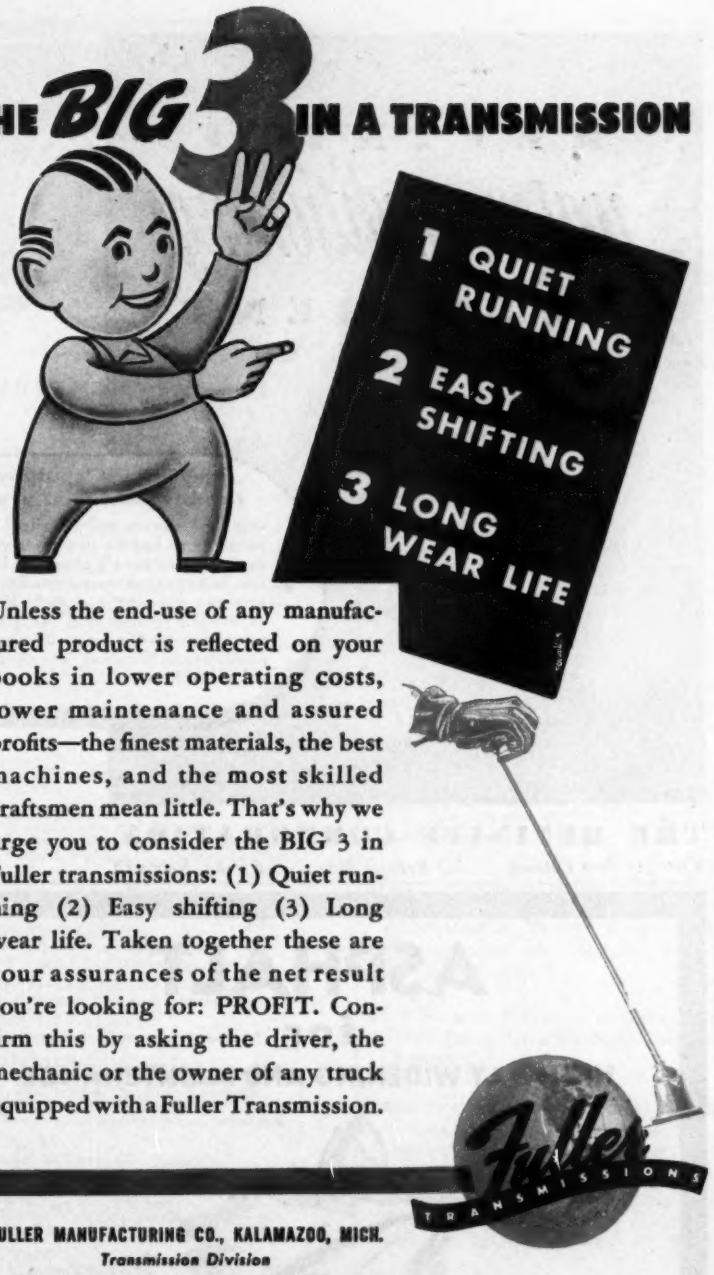

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IOWA—Annual Report of the State Board of Engineering Examiners, year ending Dec. 31, 1942.

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PLANNING SMALL BRIDGES FOR POSTWAR CONSTRUCTION—Toncan Culvert Division of Republic Steel Corp., Cleveland, Ohio.

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POSTWAR PUBLIC WORKS MUNICIPAL HANDBOOK—New York State Postwar Public Works Planning Commission and the New York State Department of Public Works, Albany, N. Y.

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THINGS WE NEED IN CLEVELAND—The City Planning Commission, City of Cleveland, Ohio.

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REGULATIONS AND STATUTES Applicable to Contractors on Public Buildings and Public Works—A reprint of Subtitle A, Title 29, of the Code of Federal Regulations. Distributed by American Road Builders Association, International Bldg., Washington 4, D. C.

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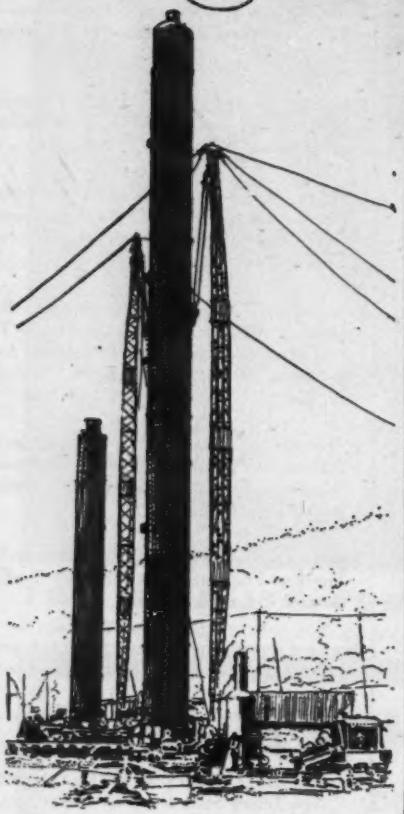

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After the cleaner has been used and most of the solution drained off, the remainder is flushed off with a pressure hose or water dip. Emulsification takes place, loosening and flushing away dirt and grease. The cleaner may be used at room temperature, and up to 90 deg. F. Samples will be furnished on request.—*Technical Processes Division, Colonial Alloys Co., Philadelphia, 34, Pa.*

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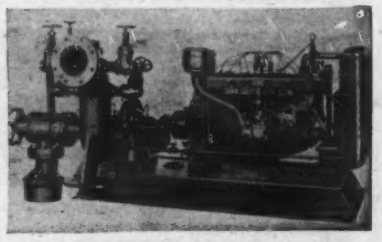
Designed as a standby unit in the event of failure of electric power or steam pressure, a new gasoline engine-driven fire pump is available in capacities of 500, 750 and 1,000 gpm. Said to



start as quickly and reliably as an automobile, this fire pump develops full horsepower in a minimum of time. It may be equipped for automatic operation starting from a pressure switch or thermostat.

The manufacturer announces that this new line of engine-driven fire pumps fully conforms to specifications of the National Board of Fire Underwriters and the National Fire Protection Association; it carries the approval of the Underwriters Laboratories and the inspection department of the Associated Mutual Fire Insurance Co.—*Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago 5, Ill.*

• • •

Protected Motor

To minimize the possibility of dripping liquids or falling solids entering the vital parts of the motor, new Century, Form J, open rated motors are

now available with the upper half of the end bracket closed. These general-purpose motors, in sizes from 1½ to 15 hp., feature two powerful fans located behind the bearing brackets which draw in cooling air. The heated air is expelled through openings at the side and bottom of the frame.—*Century Electric Co., 1806 Pine St., St. Louis 3, Mo.*

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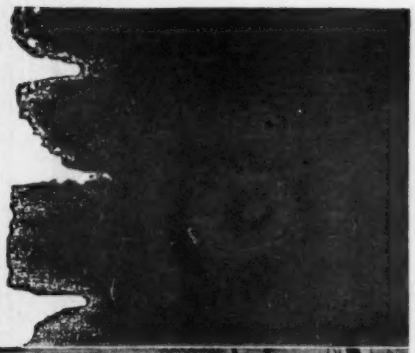
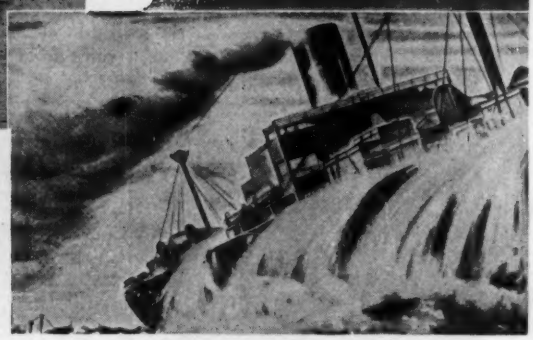
Working without a motor or other continuously moving parts, the new Celectray pneumatic indicating controller is said to have an extremely large sensitivity range. Among its special features are a simple load error adjustment, with manual reset, a choice of on-and-off or open-and-shut control, and a magnetic air-valve which acts as an amplifier and converter from electric to pneumatic operation.





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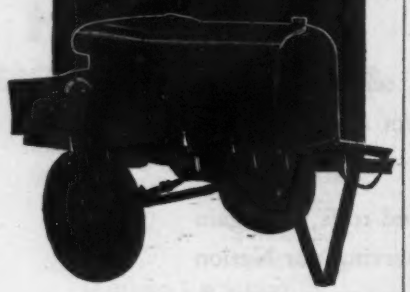

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Dozershovel

Combining full-fledged shovel and bulldozer, the recently announced Dozershovel for T9 and TD9 International TracTracTors, permits simple, quick changeover of bucket and blade in the field. As a shovel, the unit's control provides down pressure up to 4,200 lb. The

same control on the bulldozer provides penetration in hard material, and ability to hold the cut. Strong side arms permit the shovel to lift big loads and the dozer to handle any dirt-dozing job, according to the manufacturer's statement.

A special feature of the unit is its dumping trip-mechanism which tips the blade forward to release the load on uphill dozing. Other features include unobstructed visibility, low overhead clearance, oscillating tracks, quick lift, and a standard hook on the upper edge of shovel bucket or dozer blade, which adds lifting crane service to the unit.—*Bucyrus-Erie Co., South Milwaukee, Wis.*

• • •

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Due to the shortage of metal and the urgent demand for precision instruments by the armed forces, a new process has been perfected and patented for making such instruments of a special plastic, "Emeloid." It is said that instruments of this plastic are light in weight, as well as highly accurate. The company manufactures many types of

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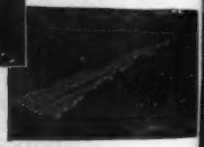

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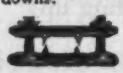

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That bulldozer, butting dirt and rocks with an impact that shakes the teeth of the driver . . . needs plenty of guts in the bolts and nuts that fasten its joints.

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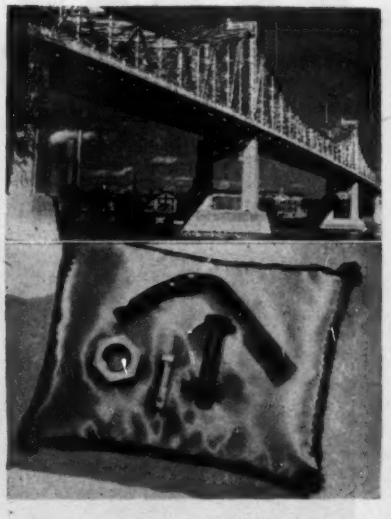

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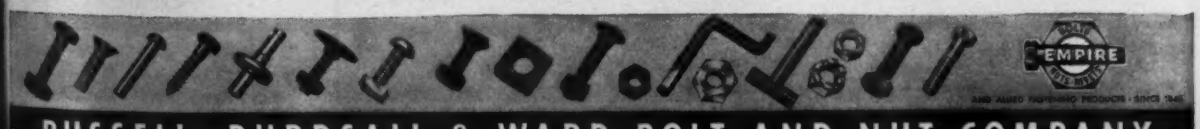


RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

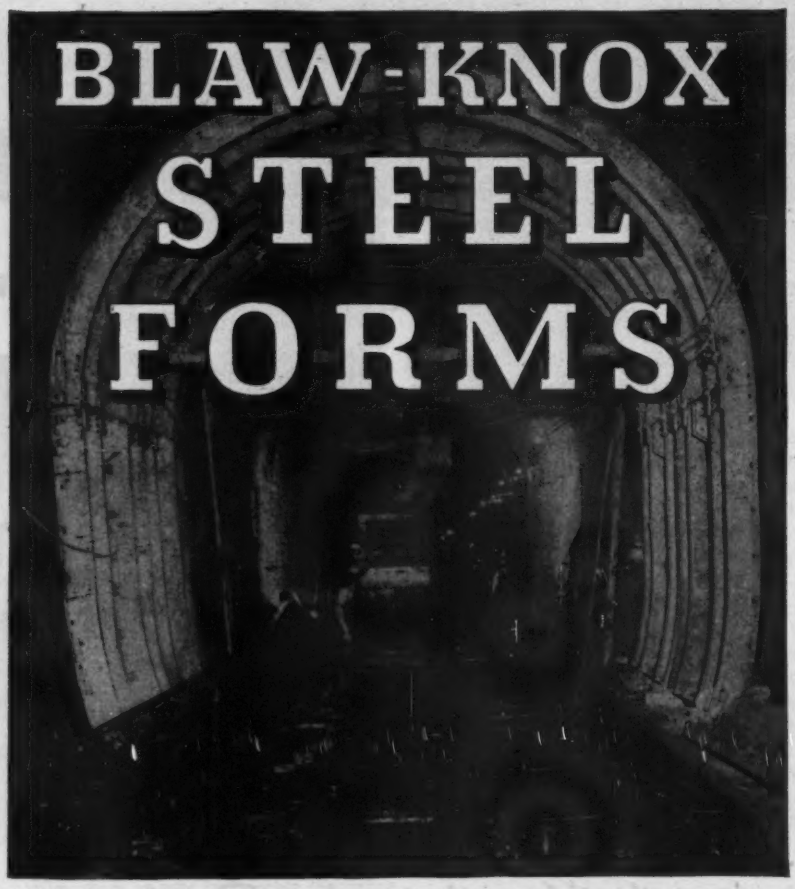
Factories at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill. *Sales offices at:* Philadelphia, Detroit, Chicago, Chattanooga, Los Angeles, Portland, Seattle

Ready for your present and future construction planning

Blaw-Knox Steel Forms are designed for speed and economy in construction, and contractors have for many years utilized our specialized engineering service to plan their jobs.

Current construction work of a sufficiently urgent nature can be served, and long range planning for the proper handling of future jobs can be aided by experienced Blaw-Knox engineers.

The engineering facilities and services extended by Blaw-Knox form engineers are prized by all who have taken advantage of them. This service is offered in the interest of engineering progress and is free from any charge or obligation.



BLAW-KNOX STEEL FORMS are used for the construction of
TUNNELS WALLS SEWERS DAMS BRIDGES PIERS
CONDUITS ROADS SEWAGE DISPOSAL PLANTS . . .
. . . and other varieties of concrete construction

BLAW-KNOX DIVISION of Blaw-Knox Co.
2067 FARMERS BANK BUILDING PITTSBURGH, PA.
NEW YORK • CHICAGO • PHILADELPHIA • BIRMINGHAM • WASHINGTON

scientific instruments, from slide rules to complicated artillery and navigation charting and calculating devices.—*The Emeloid Co., Inc., 287–291 Laurel Ave., Arlington, N. J.*

• • •

Crane Stability Gage

To eliminate the danger of heavy loads overturning cranes, a new crane

stability gage has been developed. The gage gives the operator a continuous picture of his margin of safety, and automatically stops the crane if it takes on too heavy a load, or if the boom moves too far out.—*General Electric Co., Schenectady, N. Y.*

• • •

Synthetic Rubber Repairer

Made now with synthetic rubber, "Industrial So-Lo" is available for repairing breaks or worn spots, filling holes, and resurfacing metal, wood, composition pulleys and industrial belts. It is easily applied, dries smoothly overnight, and is said to have great resistance to oil and grease, and little shrinkage.

This material is very economical, according to the manufacturer's statement,

BELMONT IRON WORKS
PHILADELPHIA BOYERSFORD EDDYSTONE

Fabricators *Contractors*
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STRUCTURAL STEEL
BUILDING & BRIDGES
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BACK OF EVERY ATTACK—

Preformed wire rope

A tiny torpedo boat races toward the enemy to deliver the kiss of death. A young skipper mans the wheel—and Preformed wire rope helps steer the craft over sub-infested waters.

The PT lets go its torpedoes. Then twists and dodges to keep out of enemy fire. And Preformed wire rope helps it get away.

Where lives are at stake, Preformed has proved its superiority. That's why on PTs—it's Preformed.

Wherever the Allies attack, Preformed is on the job, proving its flexibility, its longer life—and its ability to save precious time.

That's why back of every attack—there's Preformed wire rope.

Ask your own wire rope manufacturer or supplier for Preformed wire rope

Modernize Old Asphalt Plants

by installing the

Fluidometer

Automatic

LIQUID METERING SYSTEM

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Saves Time and Material—Insures Accuracy and Uniformity—Adaptable to All Types of Plants.

● The FLUIDOMETER is a simple, dependable, completely non-manual metering system which eliminates false tare, human errors, injuries and occupational disease hazards incidental to the handling of hot bituminous cement. With a Fluidometer, a push button replaces the weighing bucket routine. When the button is pushed, the Fluidometer delivers the predetermined quantity, then automatically resets for the next delivery. Or it may be operated automatically by the time lock. Paving mixtures are held to precise limits of uniformity—time and operating costs are saved. Accuracy proven in years of service. Adaptable to all types of plants. Write for descriptive literature. HETHERINGTON & BERNER INC., Indianapolis 7, Indiana.

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JACKSON

FLEXIBLE SHAFT VIBRATORS

. . . are the choice of those who want JACKSON standards of quality, dependability and performance. No other flexible shaft vibrator can offer such assurance.

Supplied with a 2⅜" and a 1¾" head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

Model FS-6A, illustrated above, is furnished complete with 7, 14, 21 or 28 feet of shaft. Has dirt-proof turntable base. Supplied with or without wheelbarrow mounting.

Write, wire or telephone for further information

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

one quart covering approximately 14 sq. ft. Consisting of a cement primer and a mastic, this product will prevent slipping when applied to metal and concrete stair treads. Other uses are to cover switch handles and other electrical devices, and to repair rubber boots and gloves. It comes in quart, gallon and 5-gallon containers.—*S. C. Baer Co., 1504 Times-Star Bldg., Cincinnati 2, Ohio.*

• • •

"Slope of Grain" Detector

As an important aid in determining the slope of grain in various woods, a new detector has been devised. This instrument locates and traces the grain,

thus permitting accurate measurement of its deviation from a straight line parallel to the sides of the member under test.

The tracing needle of the detector follows the grain at any point on the surface of the wood. A directional groove of any length can be scribed with this device, it is claimed, to establish the angle of deviation.—*Timber Engineering Co., Washington, D. C.*

DRILLING CONTRACTORS

DIAMOND AND SHOT CORE BORINGS—DRY SAMPLE BORINGS

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Foundation Testing for Bridges, Dams and All Heavy Structures

Also

Manufacturers of Diamond and Shot Core Drills, Accessories and Equipment

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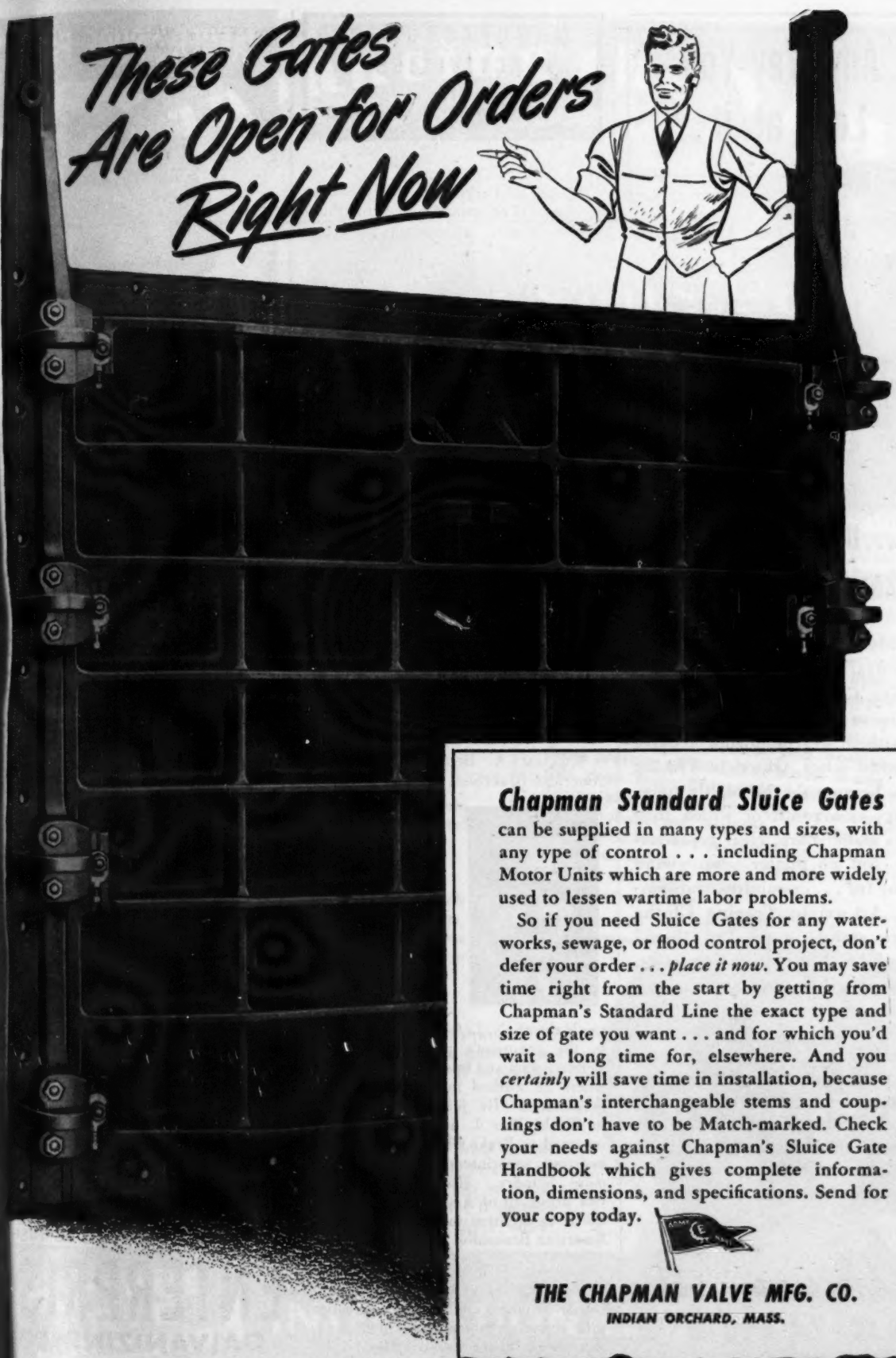
SPRAGUE & HENWOOD, Inc.
SCRANTON, PA. Dept. E U. S. A.

These Gates Are Open for Orders Right Now



Chapman Standard Sluice Gates can be supplied in many types and sizes, with any type of control . . . including Chapman Motor Units which are more and more widely used to lessen wartime labor problems.

So if you need Sluice Gates for any waterworks, sewage, or flood control project, don't defer your order . . . *place it now.* You may save time right from the start by getting from Chapman's Standard Line the exact type and size of gate you want . . . and for which you'd wait a long time for, elsewhere. And you *certainly* will save time in installation, because Chapman's interchangeable stems and couplings don't have to be Match-marked. Check your needs against Chapman's Sluice Gate Handbook which gives complete information, dimensions, and specifications. Send for your copy today.

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INDIAN ORCHARD, MASS.

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...the superiority of Arkwright Tracing Cloths Stands Out!

Some draftsmen select Arkwright Tracing Cloths because they take erasures so neatly . . . without smudging, without wearing through. Some draftsmen select Arkwright Tracing Cloths because they're highly transparent – as a result of which they always make sharp, clear reproductions. But no matter what you're looking for . . . erasability, transparency, Arkwright Tracing Cloths always stands out. Try them! Arkwright Finishing Company, Providence, R. I.

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TRACING CLOTHS
AMERICA'S STANDARD FOR OVER 30 YEARS

MANUFACTURERS' ACTIVITIES

Walter H. Parker, 51, vice president in charge of manufacturing of the Pittsburgh Equitable Meter Co., died Dec. 28, at Pittsburgh, Pa. Mr. Parker was a graduate of North Carolina State College of Agriculture and Engineering. Prior to becoming associated with the Pittsburgh firm, in 1929, he was chief engineer for the Fry Equipment Co. of Rochester, Pa. During the first World War he was a captain in the Air Corps and was honored with a citation for the development of a synchronizing principle for firing bullets between the blades of airplane propellers. During the present war Mr. Parker contributed many valuable innovations in the development and manufacture of medium caliber armor-piercing shot.

WILLIAM A. BLUME, president of American Brakeblok Division of American Brake Shoe Co., has been elected a Brake Shoe vice president.

Mr. Blume was graduated from Penn State College in 1915, and joined the Brake Snoe Co. as a special apprentice at the Mahwah, N. J., foundry. He was sent to the company's munition plant in Pennsylvania and later back to Mahwah where he worked in the experimental department. He joined the engineers in World War I, and in Aug. 1919, returned to Brake Shoe and was made assistant superintendent at the Baltimore foundry. His appointment as vice president of American Brake Shoe Co. is in addition to his presidency of American Brakeblok Division in Detroit.

APPOINTMENT of O. L. Earl as market development engineer in connection with postwar problems and planning is announced by the Pressed Metal Institute. Under Mr. Earl's direction, an

JAEGER "SURE PRIME"

—the Pumps that exceed their promises

with up to 5 times faster priming, with hi-head, hi-capacity performance, with thousands of extra hours of trouble-free service.

Self-cleaning design, replaceable liners, longest life seal, heavy duty construction thruout.

Every unit individually tested and certified — you know you're getting the best.

Sizes 3000 to over 200,000 G.P.H.

52 Lb. Bantam —3000 G.P.H.

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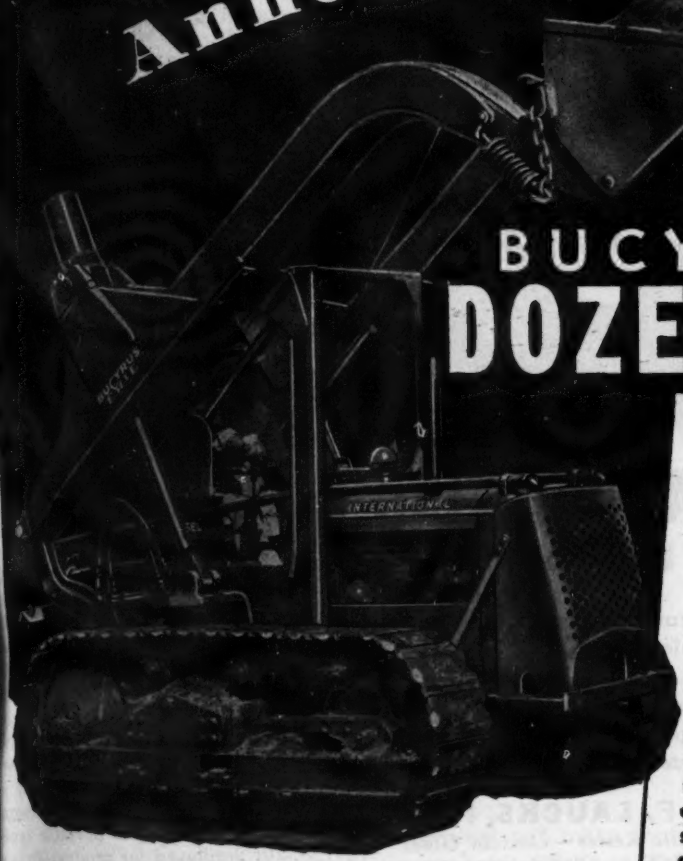
GALVANIZED PRODUCTS FURNISHED

ENTERPRISE GALVANIZING CO.

2500 E. Cumberland St., Philadelphia 25, Pa.

Announcing the NEW



BUCYRUS·ERIE DOZERSHOVEL

Here's a *new* tractor equipment unit — the completely different DOZERSHOVEL for T9 and TD9 International TracTracTors. Built for the armed forces and thoroughly tested in tough military service, the Dozershovel is now available in limited numbers for civilian use under proper government release.

The Dozershovel gives you full-fledged tractor shovel and bulldozer service through unique design. Simple interchangeability permits in-the-field changeovers in just a few minutes. You get easy penetration, even in hard materials, through hydraulic control and positive down pressure on bucket or blade. Strong side arms make lifting big loads easy, dozing sure and smooth. Other features are unobstructed visibility, oscillating tracks, and low overhead clearance. Lifting crane service is made possible by a hook on the upper edge of the bucket or blade.

Get the detailed story on this economical dirt mover from your International TracTracTor distributor. The Dozershovel is a new gateway to greater profits.

● POWERFUL DIGGING AND DOZING

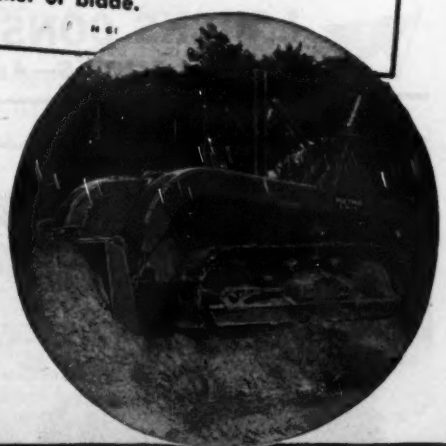
Not just another front-end shovel, the Dozershovel is both shovel and dozer. It easily digs and lifts heaping buckets, dozes full blades and level cuts. Hydraulic control and down pressure up to 4200 pounds give real "bites," even in tough materials.

● UNOBSTRUCTED VISIBILITY

No blind spots, no "guessing the load" with the Dozershovel. Its full visibility permits the operator to load full buckets quickly, to dump accurately, to doze a level surface. This feature is important in reducing operator fatigue, too.

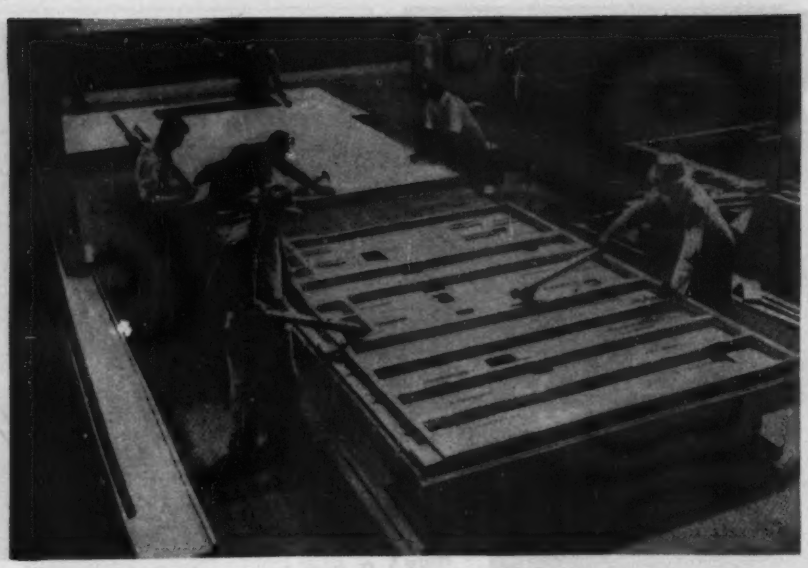
● INTERCHANGEABILITY

It takes only a few minutes to change over in the field from shovel to dozer. Just remove five pins holding the bucket, trip latch, and limit chains; set blade in place; replace pins, and the job is done. The bucket trip mechanism is a big help in dozing, too, for it permits tipping the blade forward to free the blade of its load on uphill work.



BUCYRUS ERIE TRACTOR EQUIPMENT

INTERNATIONAL TRACTRACTOR



WAR and POST-WAR HOUSING
CALL FOR WOOD and LAUCKS GLUE

WAR-LEARNED LESSONS will shape housing of the future.

Laucks Glues make possible the most modern techniques of stress-cover construction—wallboard glued to framing members—a "miracle" factor in the erection of war housing "cities." Post-war housing too, will call for the speed, strength and durability of the best war-born projects.

Laucks Glues and Laucks Glue techniques can solve tomorrow's problems as they have licked the "toughies" of wartime construction. I. F. Laucks, Inc., world's largest manufacturer of water-resistant and water-proof glues, can help *you*. For complete information, write or wire:

I. F. LAUCKS, Inc.
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CHICAGO, 2 — 6 North Michigan Avenue
LOS ANGELES, 1 — 859 E. 60th Street
SEATTLE, 4 — 911 Western Avenue
Factories:
Seattle, Los Angeles, Portsmouth, Va., Lockport, N. Y.
In Canada:
I. F. LAUCKS, Ltd., Granville Island, Vancouver, B. C.
HERCULES-LAUX-MERRITT, Ltd., Stanbridge, Quebec

LAUCKS CONSTRUCTION GLUES
Consult LAUCKS—America's Glue Headquarters

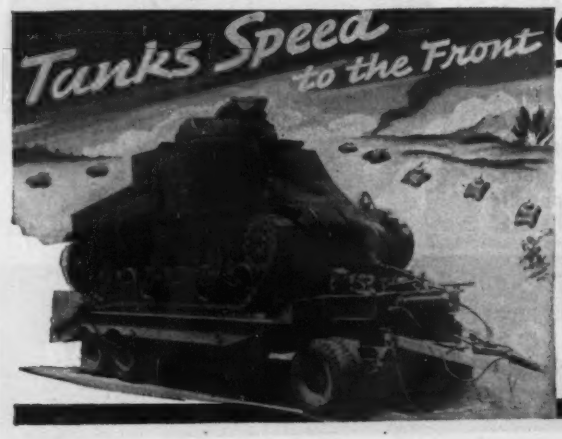
engineering and market development program will be undertaken to further cooperation with the government in redesigning war material and stampings, and in locating available facilities and manpower in the pressed metal industry.

LINK-BELT SPEEDER CORP. of Chicago, Ill., and Cedar Rapids, Ia., manufacturers of excavating machinery and cranes, announce the appointment of Juan Homs as Latin-American representative.

Mr. Homs is widely-known abroad. His first foreign selling assignment, in 1913, took him to Mexico and the West Indies. He recently returned from the Amazon valley after completing an assignment for the Rubber Development Corp., and is now preparing to leave on a trip which will include all of the important Latin-American countries.

STERLING TOOL PRODUCTS CO., Chicago, announces the appointment of J. A. Proven as general sales manager. Mr. Proven was formerly with the Victor Adding Machine Co. He has had considerable experience in the development and promotion of mechanical products. In his new position he will take charge of an expanded sales and advertising program featuring a new electric portable sander specially developed for production sanding.

ANNOUNCEMENT has been made that two long established firms have joined forces to create a new source of supply for plumbing drains, marine fittings, and similar specialties. The new organization is the Wade Manufacturing Co., Division of Woodruff & Edwards, Inc., with main offices and plant at Elgin, Ill.



on ROGERS TRAILERS

EXPERIENCE *builds 'em* PERFORMANCE *sells 'em*

GETTING there "fustest with the mostest" as one early American General aptly phrased it, is battle strategy that really conquers!

In the lightning speed of mechanized warfare tanks ride "Pick-A-Back" to battle on ROGERS TRAILERS so their fighting capacity is unimpaired. Special ROGERS TRAILERS retreive disabled tanks so they can be repaired and rushed into battle again.

ROGERS TRAILERS are doing a real war job at home and abroad. New models which will be available to industry when war contracts are completed will be even better-engineered and more efficient than their predecessors.

ROGERS BROS. CORPORATION
ALBION,
PENNA.

Make THIS the FIRST AIM of Your Post-War Design...

LOWER Operating and Maintenance COSTS

Dictators may perish, states may fall, but Old King Cost will still rule after this war. Lower operating and replacement costs will be more important than ever . . . not only to survive in the fierce domestic competition that will surely follow, but also to enable American workmen to compete in the world market.

Design Now Around ROLLWAY RIGHT ANGLE ROLLER BEARINGS

Rollway Right Angle Bearings will make your machines last longer—at lower power, maintenance and replacement costs. That's because right angle loading splits the load into its two components of pure radial and pure thrust. A simplification that reduces the unit loading on rollers and bearings—that insures lower starting and running torque—that holds rubbing and wear-back of roller ends to a minimum—and that guarantees a longer period of precision operation.

● All radial loads carried at right angles to the roller axis.

● All thrust loads carried at right angles to the roller axis.

Examine the cut-away drawing of the Rollway Bearings on this page. See how every load component—both pure radial and pure thrust—is carried at right angles to the roller axis. See how no oblique forces, or no composite forces can pile up on a single bearing. In any given dimensional limit, Rollway Bearings will give you greater load capacity, higher heavy-duty speed or an increased life expectancy of the bearing.

● Available in a wide range of sizes and types in S.A.E. and American Standard metric dimensions and tolerances. Our engineering recommendations may save you both money and future bearing troubles. Send us your designs now for free, confidential bearing analysis.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

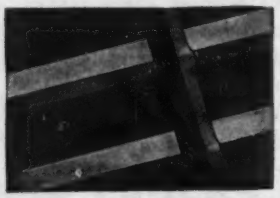
BUILDING HEAVY-DUTY BEARINGS SINCE 1908 — BEARINGS

THE EXTRA STRENGTH AND CLEANLINESS OF

BATES-GRATES

AT NO EXTRA COST

The clean fillet weld you see on that section of BATES-GRATES gives you a combination of maximum strength and floor safety that makes it very much worthwhile to specify BATES-GRATES for your open steel flooring.



Note the crisp, dirt-and-grease-shedding tread the entire length of the Hex Cross Bar. BATES, alone, gives you that, too.

Write for copy of well-illustrated, 8½" x 11" CATALOG NO. 43-44. It gives complete data on fillet welded Open Steel Flooring and Stair Treads.

WALTER BATES COMPANY, INC.
JOLIET • ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

MEN AND JOBS

D. J. Summerville, Ladysmith, Wis., highway engineer of Rush county for 19 years, has been appointed a member of the Wisconsin state highway commission to succeed William E. O'Brien who has been appointed state director of the U. S. War Manpower Commission.

Oliver Hanson has been named Deuel county highway superintendent at Clear Lake, S. D., to succeed Carl J. Johnson, who resigned recently after holding that position for 20 years.

Capt. Fred Houston, formerly an engineer at the Sioux ordnance plant, Sidney, Neb., has been transferred to Provo, S. D.

Mason M. Williams, superintendent of public works at Lenoir, N. C., for the past 16 years, has just resigned, effective Jan. 1, to take over the operation of the Lenoir Ice & Fuel Co.

J. L. Lamson, associate engineer, and **Fred E. Day,** assistant engineer, of the district office of the U. S. Geological Survey at Asheville, N. C., have been transferred to the survey's new headquarters at Raleigh, N. C. **W. R. Eaton** of Chattanooga will remain in charge of a small staff which will stay in Asheville to handle the survey's work in western North Carolina and northern Georgia.

Marvin J. McGowan, of Staten Island, N. Y., who was connected with the U. S. Coast and Geodetic Survey at Washington, D. C., before entering the army last January, has been promoted to technical sergeant with the 52nd Engineer Combat Battalion at Camp Butner, N. C.

Appointments of **Fisher L. Layton,** of Flint, as director of the administrative division of the Michigan State Highway Department, and of **Wilson J. McDonald** of Petrosky as finance director, have been announced by Charles M. Ziegler, state highway commissioner.

Maj. E. E. Gialdini has been name commanding officer of the Twin Cities ordnance plant near New Brighton, Minn., succeeding Capt. V. A. Lunn, who has been appointed control officer in the army ordnance department small arms ammunition suboffice at Philadelphia, Pa. Major Gialdini comes from the Des Moines ordnance plant.

RECONDITIONED WITH "GUNITE"

These photos show the disintegrated condition of the buttresses of the downstream face of the Rock Spillway of a power dam of the Central New York Power Corporation, Trenton Falls, N. Y., and the reinforcement placed for "GUNITE" restoration of the structure.

Our Bulletin 2200, showing similar and many other types of "GUNITE" work, is available on request.

The "CEMENT GUN" can be bought by anyone, and used without restrictions.

CEMENT GUN COMPANY
Manufacturers of the "CEMENT GUN"
ALLENTOWN, PENNSYLVANIA

WE ARE ALSO "GUNITE" CONTRACTORS
LET US BID ON YOUR WORK

ELEVATED TANKS

• 100,000 Gallon Elevated Water Storage Unit on 75' Tower—Upper Marlboro, Maryland.

Designed for quality, safety and economy either to Customer's specifications or our standard tank.

Consult Lancaster's specialized engineering service when you have a problem in tanks. Complete information will be furnished promptly with no obligation to you. Write, telephone or wire today.

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FELT-COTE ASBESTOS-PROTECTED METAL ROOFS AND SIDING

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Now! Without Priority

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Repairs, Maintenance, Allowable Improvements will yield you Permanent Assets from Current Earnings. Use FELT-COTE

Government authority allows repairs, maintenance, and certain improvements as "deductible" items without priority rating (in accordance with L-41). Earnings not devoted to some constructive use will be taxed as "excess." As much as 80% of your FELT-COTE job may be offset by this one difference. Let us tell you how. Learn about the speed of installation and the long service life of *asbestos-protected* metal for corrugated Roots and Siding and for Ventilators. Adequate supplies—prompt delivery.

In the production of FELT-COTE, high-quality steel sheets are coated, inside and out, with special asphaltic compounds prepared at the company's own distilling plant. They are then jacketed with superior long-fibre asbestos felt, which is itself impregnated with asphalt and bonded to the asphaltic undercoat by heat and pressure. Finally, a tough, elastic weatherproofing coat is added. Engineering service in the exact designing and patterning of FELT-COTE for each job, and erection service to make sure that it is correctly applied, have been developed on an extensive scale.

Steel mills, aluminum and magnesium plants, hangars, airplane assembly shops, repair docks, ordnance and munition works, warehouses and supply depots—industrial and Government-owned buildings in all parts of the United States and on every continent, are covered with FELT-COTE.

We will gladly mail literature or send a representative to prepare estimates.

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Roofs—Siding—Ventilators—Louvers—Ducts

AMERICAN STEEL BAND COMPANY

PITTSBURGH, PA.

ESTABLISHED 1891 **PLANT, CARNEGIE, PA.**

CONTINENTAL DIVIDE, TWO MILES UP

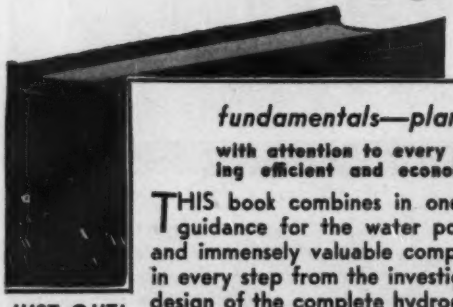
One of the LINN HAFTRAKS used on the difficult terrain of the Inter-American Highway.

THE LINN MANUFACTURING CORPORATION
MORRIS, NEW YORK

How to design water power systems

a thorough treatment of fundamentals—plant location and design

with attention to every factor important in developing efficient and economical hydroelectric projects



THIS book combines in one volume textbook and reference guidance for the water power engineer—descriptive details and immensely valuable comparative data to help the engineer in every step from the investigation of water power sites to the design of the complete hydroelectric system.

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BY H. K. BARROWS

3rd edition. 791 pages, 6x9, 315 illustrations $6.00

A sound, authoritative treatment of principles and practice underlying the design of hydroelectric power developments. Covers theoretical fundamentals and the complete water power project. Descriptions of equipment, methods of design, data on costs, and other practical features make it invaluable as a guide for the engineer.

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NEW TRADE PUBLICATIONS

Tool Maintenance Manual—"How To Get The Most From Your Portable Electric Tools" is the title of a special section in a new catalog designed as a handy guide to greater production and longer tool life. It is full of illustrations and suggestions on the care and operation of portable electric tools—useful for purchasing agents, engineers, production men and maintenance men. —*Skilsaw, Inc.*, 5033-43 *Elston Avenue, Chicago*, 30, *Ill.*

Cranes and Hoists—A 64-page bulletin on cranes, ore bridges, unloaders, hoists and similar installations describes such materials handling equipment, giving a complete story of the crane from the pioneer shipyard whirlers to the modern screw luffing type; includes gantry cranes, 250-ton hammerhead crane, shipyard cranes for present day shipyards, floating cranes of 15 to 100-ton capacity, ore bridges, coal unloaders, mine hoists, and hoisting apparatus for dam gates. Request on business letterhead to—*Dravo Corporation, Neville Island* 25, *Pittsburgh, Pa.*

Film on Safe Earthmoving—"Safe Earthmoving," a strip sound film dedicated to safe practices in the operation of earthmoving machinery, has been made available for free loan, both here and abroad.

The film shows possible earthmoving equipment hazards. It visualizes the right way, with insert cartoons showing amusing yet serious mishaps. It is for the benefit of contractors and all others in construction work. Running time is 13 minutes, including music and narra-

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Changes in wire rope strengths, sizes, grades makes this new catalog a necessity to anyone specifying, using, and buying wire rope.

Information contained in the new 1944 Guide will save you delay in purchasing of wire rope, as well as help you conserve (through proper maintenance) your present wire rope.

Designed, Written for Wire Rope Users

Every wire rope user who *needs* a catalog for reference should have this one. It will help you on the job. This is no ordinary manufacturer's catalog. It is designed and written for the wire rope consumer.

Ask for your copy of Catalog G-15

To Charge, simply write your request on company letterhead and mail to Macwhyte Company, or any of our distributors and mill depots near you.

NEW TYPE GUIDE... Many New Features!

Inside the covers of this 160 page BUYERS' GUIDE are all the facts and figures you'd expect to find about wire rope, PLUS many that will surprise you. And it's completely indexed with visual tabs for quick reference. Here are only a few of many features:

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A Ludlow 36" gate valve provides a closure as snug and leakproof as in a 3" valve.

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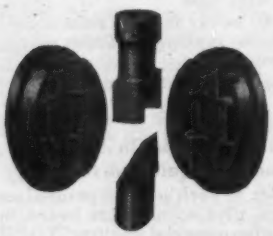

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Building Maintenance—Wartime conditions put special burdens on the executive charged with keeping his buildings in first class condition. He must avoid interruption in his production lines. He must conserve existing construction. He must use his own maintenance staff wherever possible. His materials must be of the best. To help him, this company has put out an indexed folder entitled "Maintaining Your Buildings Today." It is a complete compendium of timely information on this subject.—*L. Sonneborn Sons, Inc., 88 Lexington Avenue, New York 16, N. Y.*

Hydrogen-ion Concentration—Wherever it is important for operators of industrial processes, such as neutralization, precipitation, corrosion-prevention and boiler feedwater treatment, to be able to "see" pH at a glance, or to refer to a continuous pH record drawn on a handy, easy-to-file chart, this new catalog should be of interest.

It describes an equipment which consists of a rugged glass-electrode assembly and a micromax recorder—either a strip-chart Model S or a round-chart Model R. Through the electrode assembly chamber flows a continuous sample of the process solution, where it completely covers the electrodes and a temperature compensator. The voltage thus set up is continuously measured by the micromax which indicates and records directly in pH units. *Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.*

Steel and Wood Water Pipe—This book gives concise facts of interest to consulting engineers, superintendents, engineers of waterworks or others having liquids of any nature to convey. One of the most interesting features is a history of wood pipe, beginning over 400 years ago. It records how some wood pipe in London was taken up in 1862 after having been down 249 years. —*The Michigan Pipe Co., Bay City, Mich.*

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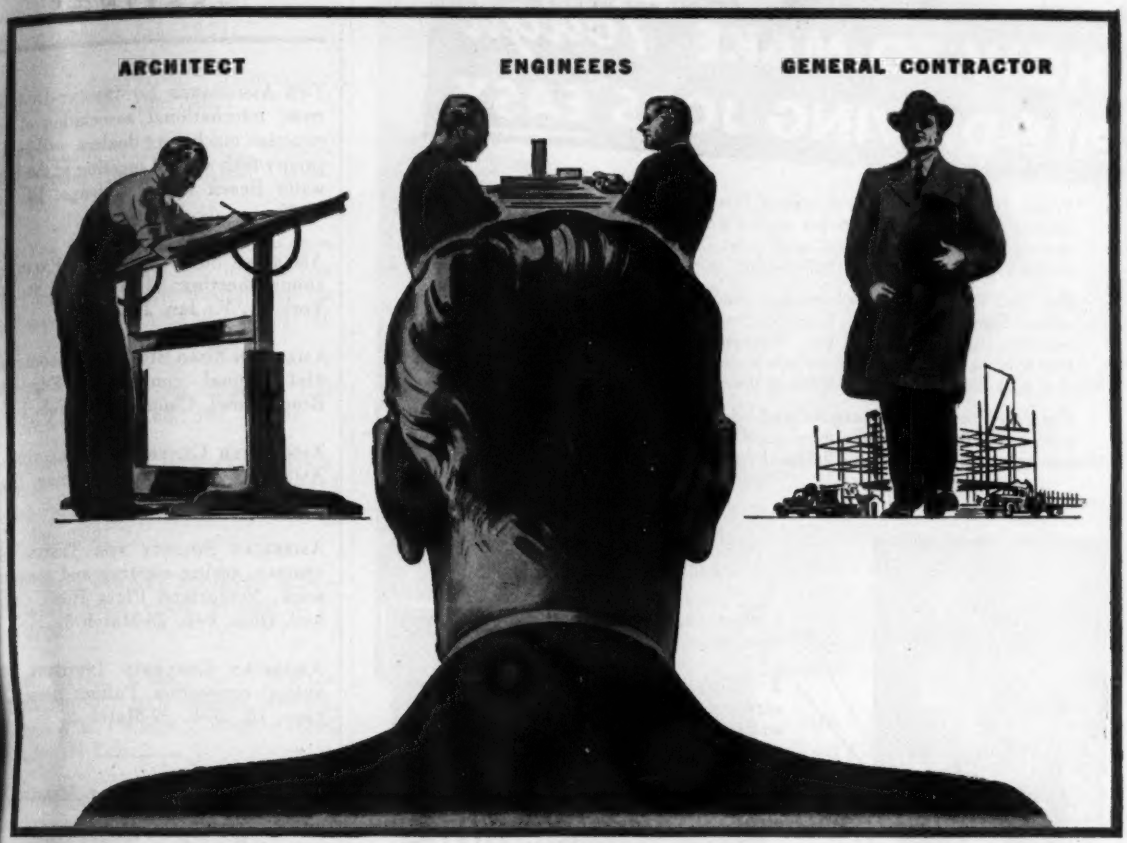

what can I do now
ABOUT POST WAR PLANS?

There is a tremendous amount of private and public construction that is necessary and will be needed immediately after the war is won. But if site, financing, complete plans and specifications are not ready in advance, well planned economical construction cannot start quickly; nor can the recent great progress that has been made in materials, design and construction methods be taken advantage of without advance planning.

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MEETINGS

THE ASSOCIATED EQUIPMENT DISTRIBUTORS, international association of construction machinery dealers, will hold its twenty-fifth annual meeting at the Edgewater Beach Hotel, Chicago, Ill., Jan. 17-20.

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual meeting, 33 West 39th St., New York, N. Y., Jan. 19-21.

AMERICAN ROAD BUILDERS' ASSOCIATION, 41st annual convention, Edgewater-Beach Hotel, Chicago, Ill., Feb. 1-3.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, 25th annual meeting, Drake Hotel, Chicago, Ill., Feb. 7-9.

AMERICAN SOCIETY FOR TESTING MATERIALS, spring meeting and committee week, Netherland Plaza Hotel, Cincinnati, Ohio, Feb. 28-March 3.

AMERICAN CONCRETE INSTITUTE, 40th annual convention, Palmer House, Chicago, Ill., Feb. 29-March 2.

REGIONAL AND LOCAL MEETINGS

OKLAHOMA SOCIETY OF PROFESSIONAL ENGINEERS, 9th annual meeting, Mayo Hotel, Tulsa, Okla., Jan. 14-15.

KANSAS CITY CHAPTER, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, Kansas City, Mo., Jan. 17.

ASSOCIATED GENERAL CONTRACTORS OF MISSOURI, annual meeting, Statler Hotel, St. Louis, Mo., Jan. 18-19.

CENTRAL BRANCH, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, Des Moines, Iowa, Jan. 19-20.

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MARINE RAILWAYS

CANADIAN CONSTRUCTION ASSOCIATION, annual meeting, Chateau Frontenac, Quebec, Canada, Jan. 19-21.

KANSAS CONTRACTORS' ASSOCIATION, Kansas City, Mo., Jan. 20-21.

NEW ENGLAND WATER WORKS ASSOCIATION, Hotel Statler, Boston, Mass., Jan. 20.

NEW YORK STATE SEWAGE WORKS ASSOCIATION, 16th annual meeting, in conjunction with annual meeting of the Sanitary Section, A.S.C.E., Hotel McAlpin, New York, N. Y., Jan. 21.

PURDUE ROAD SCHOOL, Purdue University, Lafayette, Ind., Jan. 24-26.

WISCONSIN COUNTY HIGHWAY COMMISSIONERS ASSOCIATION, annual road school, Schroeder Hotel, Milwaukee, Wis., Jan. 25-27.

N. Y. STATE COUNTY HIGHWAY SUPERINTENDENTS ASSOCIATION, Albany, N. Y., Jan. 27-28.

TEXAS WATER WORKS AND SEWAGE SHORT SCHOOL, 26th annual meeting, Texas A. & M. College, College Station, Tex., Jan. 31-Feb. 2.

CONSTRUCTORS ASSOCIATION OF WESTERN PENNSYLVANIA, annual meeting and dinner, Hotel William Penn, Pittsburgh, Pa., Feb. 1.

SOUTHEASTERN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual meeting, Hotel Roanoke, Roanoke, Va., Feb. 9-10.

MICHIGAN HIGHWAY ENGINEERING CONFERENCE, 30th annual meeting, Grand Rapids, Mich., Feb. 8-March 1.

THE NEW JERSEY MOSQUITO EXTERMINATION ASSOCIATION, the Hotel Madison, Atlantic City, New Jersey, Mar. 15, 16 and 17.

Elections and Activities

Merrill C. Lorenz of the Gould Construction Co. at a recent meeting was elected president of the Tri-City Section of the American Society of Civil Engineers. Major Frank W. Ashton, chief of the engineering division Rock Island district, U. S. Engineers, was appointed vice president and Edwin R. Milland, chief of the survey section of the Rock Island district, was elected secretary-treasurer.

Nearly sixty members were present at the meeting, which was the largest since

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Wherever modern well water producing equipment is used—whether in the United States or in foreign lands, that which bears the name of Layne is definitely recognized as the world's standard by which all other makes are judged.

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LAYNE

WELL WATER SYSTEMS

DEEP WELL PUMPS

Builders of Well Water Systems for every Municipal and Industrial Need

the Tri-City Section was organized. Col. W. N. Carey, chief engineer of the Federal Works Agency, and A. N. Carter, assistant editor of *Engineering News-Record*, were the speakers. Colonel Carey discussed postwar planning, stressing that too little planning and preparation of blueprints has been done. Mr. Carter with the aid of lantern slides, described his trip last summer over the Inter-American Highway.

J. E. S. Thorpe has been elected vice-president for the Asheville, N. C., subdistrict of the Tennessee Valley section of the American Society of Civil Engineers.

Harry Rule, superintendent of the St. Elmo waterworks plant, has been elected president of the Illinois Water Plant Operators Association. Other officers are: Paul Harris, superintendent of the Herrin waterworks plant, vice president, and Erwin Craig, superintendent of the Zion waterworks, secretary. Carl Duy, superintendent of the Aurora waterworks, received the association's annual trophy for the best plant management during the last year. Honorable mention went to Harry Rule, superintendent of St. Elmo.

Edwin W. Seeger has been elected president of the Engineers Society of Milwaukee, Wis.

Joseph P. Schwada, Milwaukee City engineer, was elected chairman of the Wisconsin section of the American Water Works Association at the recent annual meeting in Milwaukee. He succeeds O. G. Muegge of Madison, assistant state sanitary engineer. Leon A. Smith, superintendent of the Madison water department who has been secretary-treasurer since 1927, was re-elected. During the meeting which was held in conjunction with the Engineering Society of Wisconsin, Herbert H. Brown, Milwaukee waterworks superintendent, and Mr. Schwada were announced as winners of the George Warren Fuller award for outstanding work in design and construction of the city's filtration plant and for service to the state waterworks association.

The Engineering Society of Wisconsin at its annual meeting in Milwaukee, voted to amend its constitution and reorganize in the form of a society which is planned to represent all professional engineers of the state. It was also decided to affiliate with the National Society of Professional Engineers and to change the name of the state organization to the Wisconsin Society of Professional Engineers on Jan. 1. The reorganization plan was adopted following discussions on the subject.

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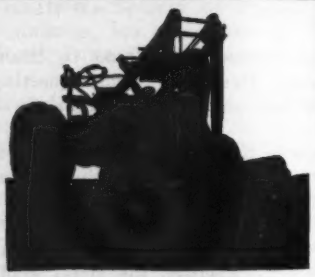

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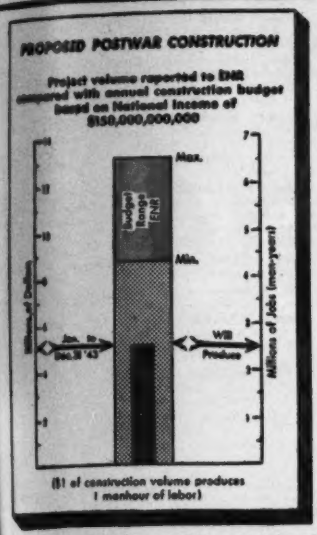
POSTWAR PROJECTS


PROPOSED POSTWAR CONSTRUCTION
Project volume reported to ENR compared with annual construction budget based on National Income of $150,000,000,000
Max.
Min.
Budget Range ENR
Millions of Dollars
Millions of Jobs (man-years)
Jan. 1, 1940 Dec. 31 '43
WB Produce
($1 of construction volume produces 1 manhour of labor)

rojects proposed for postwar construction ve been published in these columns since nuary, 1943, as they have been reported ENGINEERING NEWS-RECORD. The chart above shows, both in estimated llar volume and in jobs or man-years of bor, how fast this reservoir of future rk is filling up.

WATERWORKS

Minn., St. Louis Park—Village, water storage reservoir, $50,000, plans under way; watermain in France Ave. from Randolph St. to Minnetonka Blvd., $25,000, plans complete; well, pump and pump house, $25,000.

N. J., Newark—City, City Hall, water distr. sys. imprva., throughout city. $320,000. D. Coles, City Hall Annex, acting engr.

N. Y., Binghamton—Dpt. Mental Hygiene, State Office Bldg., Albany, water supply, incl. reservoir, pump house and pumps. $50,000. Plans under way.

N. Y., McKeever—U. S. Eng., Chimes Bldg., Syracuse, multiple reservoir at Panther Mountain on Moose River, 8 mi. from Inlet. $3,470,000.

N. Y., Mt. Kisco—City, imprv. water sys. $2,000. Fowler Engr. Corp., Mt. Kisco, engrs. Bids 12/15.

N. Y., Orangeburg—Dpt. Mental Hygiene, State Office Bldg. Albany, water supply, pipeline $400,000, water supply, filter plant addn., Letchworth Village, $150,000, both Rockland State Hospital. Plans underway.

N. Y., Willard—Dpt. Mental Hygiene, State Office Bldg., Albany, water supply, $36,000, water supply and filtration plant, $225,000, at Willard State Hospital. Plans under way.

O., Elyria—City, watermain extens. $73,600. M. Powell, city engr.

O., Lima—City, water filtration plant addn. $4,000. J. F. Cupp, City Hall, city engr.

O., Middletown—City, water distr. sys. exten. $2,750. L. F. Diefenbach, City Hall, city engr.

Tex., Electra—City, water purification plant, $3,500.

Tex., Electra—City, replacing watermains. $3,158.

Wash., Seattle—City, W. H. Devin, mayor, County-City Bldg., Zone 4, WW repairs and replacements. $1,913,000; extension, Cedar watershed, $880,500; pipelines, cleaning, relining, $3,306,800.

Ont., Whitby—Municipality, c/o J. R. Frost, engr., water tank, $55,000, watermains, $25,000, lake $15,000. CD 5/25—ENR 5/27.

SEWERS & WASTE DISPOSAL

Conn., New Haven—City, J. Golden, dir. of P. Wks. Dpt., Hall of Records, disposal plant, $677,335 and sewerage sys., $2,526,150. Metcott & Mapes, Inc., 139 Orange St., engrs. Bids 10/26—ENR 10/26.

Minn., Blue Earth—W. Enger, city clk., City Hall, sewage disposal plant, $200,000.

Minn., Elmore—G. F. Koepke, city clk., sewerage disposal facilities, incinerator, $50,-

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POSTWAR PROJECTS (Cont'd.)

Minn., Gilbert—F. J. Indihar, city clk., City Hall, new sewage plant or imprv. existing plant. Over $25,000 (not official).

Minn., Holland—Village, Mrs. L. Holland, clk., sanitary sewerage sys., disposal plant, $25,000 or more.

Minn., Mountain Lake—Village, surveys, storm sewerage sys. $25,000 (not official). R. D. Thomas & Associates, 1200 2nd Ave. S., Minneapolis, engrs.

★ **Minn., Rochester**—City, F. R. Finch, clk., revising plans sewage disposal plant, $600,000. A. C. Smith, city engr. Pillsbury Eng. Co., 1200 2nd Ave. S., Minneapolis, consult. engr.

Minn., St. Louis Park—Village, J. C. Utzt, engr., sanitary sewers in various streets, $85,000; storm sewer, $25,000, plans complete; trunk sanitary sewer to care for south and west parts of village, over $25,000.

Minn., Tyler—E. T. McEvoy, village clk., sewage disposal plant. Over $25,000.

Tex., Electra—City, replacing sanitary sewer mains, $25,000.

Minn., Winona—Imprv. sewerage sys., incl. new ejector houses, expansion sewage pump facilities. Over $25,000. E. E. Chadwick, city engr.

N. Y., Ossining—Dpt. Correction, State Office Bldg., Albany, sewage disposal at Sing Sing Prison, $90,000. Plans under way.

O., Canton—City, sewage disposal plant. Over $25,000. J. Shisler, city engr.

O., Conneaut—City, sewage disposal plant, incinerator. $350,000. W. V. Kantola, city engr.

★ **O., Dayton**—City, storm sewers, $1,400,000; sanitary sewers, $650,000. G. F. Baker, City Hall, city engr.

O., Geneva—Interceptor sewer. $70,000. R. Case, city engr.

O., Girard—City, incinerator plant, sanitary and storm sewers, Parkwood Dist. Over $25,000. B. D. Church, city engr.

O., Jackson—City, sanitary sewers, sewage treatment and disposal plant. $150,000. W. H. Monahan, city engr.

O., Kenton—City, sewage disposal plant. Over $25,000. P. Strong, city engr.

O., Lancaster—City, sewerage sys. extens. Over $25,000. W. W. Graf, City Hall, city engr.

O., Lima—City, incinerator plant. $100,000. J. F. Cupp, City Hall, city engr.

O., Marion—City, 3,700 ft. 48 in. storm sewer, $32,000; 5,200 ft. 18- to 24-in. sanitary sewers, $45,000. T. C. Cathers, City Hall, city engr.

O., Newcomerstown—Village, E. Treasure, mayor, sewer extens. Over $25,000.

Tex., Electra—City, replacing sewage disposal plant. $63,500.

Wis., Neenah—R. V. Hauser, city clk., garbage incinerator plant. $40,000. A. G. Prenuske, city engr.

Wis., New London—City, Mrs. J. C. Freeman, clk., sewage treatment plant, reconstructing sewerage sys. Over $25,000.

Ont., Brockville—Municipality, c/o C. G. MacOdrum, mayor, sewers. $350,000.

BRIDGES, GRADE CROSSING ELIMINATION

Calif., Santa Rosa—Sonoma Co., Courthouse, Jimtown bridge across Russian River, $200,500; Denman Flat bridge $25,400; El Verano bridge over Sonoma Creek, $63,200; widening Hacienda bridge across Russian River, $30,000.

†**Colorado**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., selection final locations for 5 bridges and completion bridge designs, completion designs for lining and enlargement 3 tunnels, all in Clear Creek Canyon between Golden and Forks Creek on US 40, length 12 mi.

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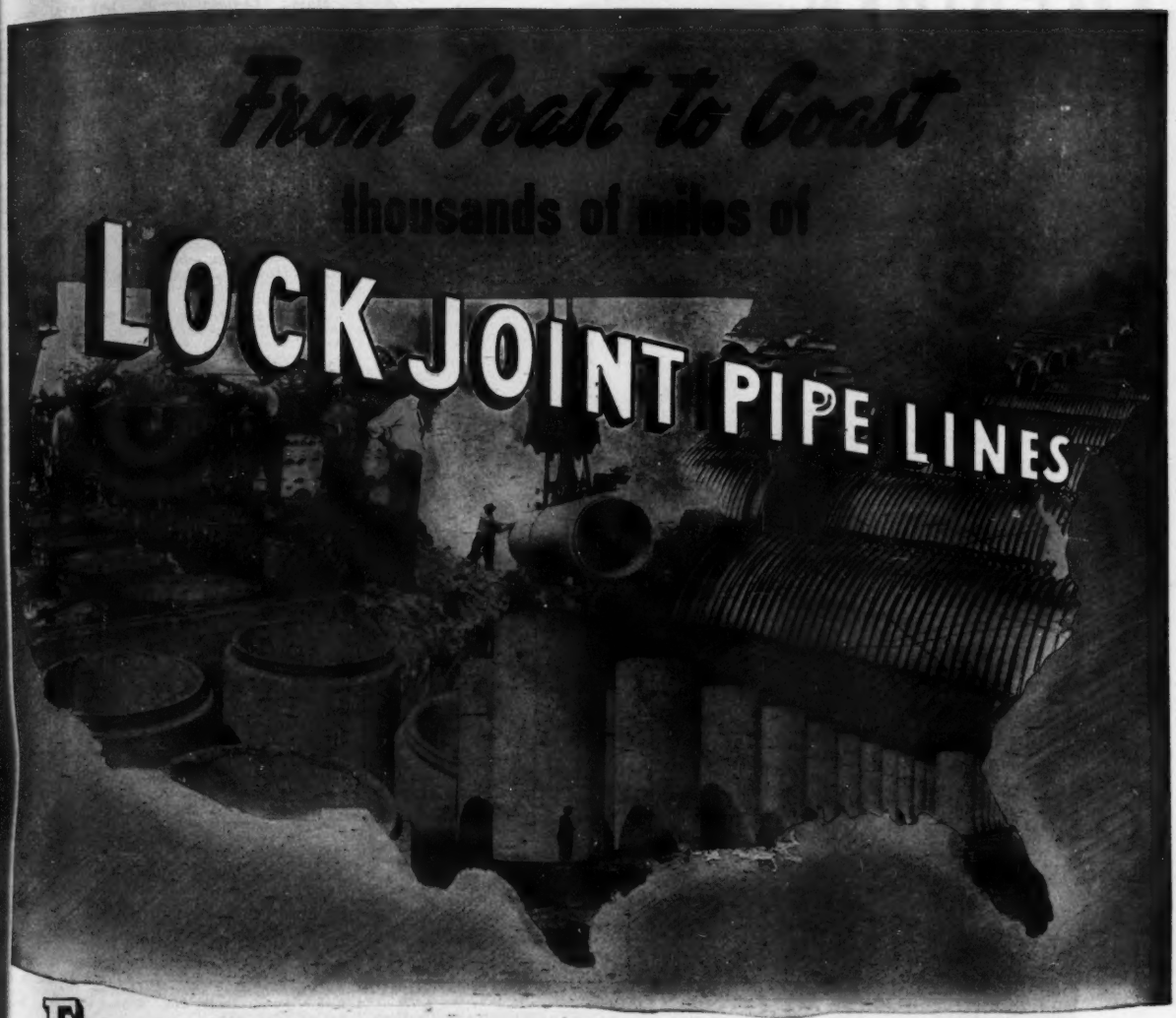

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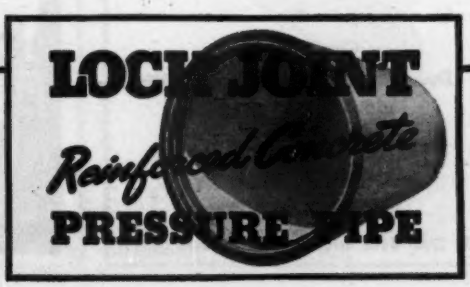

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POSTWAR PROJECTS (Cont'd.)

Mass., Leominster—M. LaPierre, mayor, City Hall, reconstructing Main St. bridge, $25,000.

†**Minnesota**—Pub. Rds. Admin., 18 and P Sts. N.W., Wash., 25, D. C., 1.5 mi. new bridge over Mississippi River to replace structure on Washington Ave. between Minneapolis and St. Paul.

†**Nebraska**—Pub. Rds. Admin., 18 and P Sts N.W., Wash., 25, D. C., 1.5 mi. bridge approaches over Nemaha River south of Dawson on US 75.

N. Y., Amenia—New York Central System, S. E. Armstrong, ch. engr. 466 Lexington Ave. New York, grade crossing elimination at Fowler, Case No. 6579. $202,500. Design funds available.

N. Y., Amherst—Lehigh Valley R.R. Co., R. E. Patterson, ch. engr., 425 Brighton St., Bethlehem, Pa., grade crossing elimination at Cayuga St., Case No. 5382. $105,000. Design funds available.

N. Y., Amsterdam—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at Minanville St., Case No. 6691. $73,000. Plans under way.

N. Y., Ashford—Baltimore & Ohio R.R. System, A. C. Clarke, ch. engr., Baltimore and Charles Sts., Baltimore, Md., grade crossing elimination at Murphy Rd., Cattaraugus Co., Case No. 9936. $175,000. Design funds available.

N. Y., Avoca—Delaware, Lackawanna & Western R. R. Co., G. A. Phillip, ch. engr., Passenger Terminal, Hoboken, N. J., grade crossing elimination at Village Sts., Case No. 9945. $450,000. Design funds available.

N. Y., Bainbridge-Unadilla—Delaware & Hudson R.R. Corp., P. O. Ferris, ch. engr., foot of State St., Albany, reconstruction, grade crossing elimination at Hy. 5012. $250,000. Plans complete.

N. Y., Batavia—Lehigh Valley R.R. Co. R. E. Patterson, ch. engr. 425 Brighton St., Bethlehem, Pa., grade crossing elimination at Ellicott St., Case No. 5396. $122,200. Design funds available.

N. Y., Batavia—Stafford—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 5146 A. $350,000. Design money available.

N. Y., Black River—New York Central System, S. E. Armstrong ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 5175. $200,000. Plans complete.

N. Y., Brewster-Carmel—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 909. $170,000. Plans under way.

★**N. Y., Buffalo**—New York Central System, 466 Lexington Ave., New York, S. E. Armstrong, engr. M.W.-Sys., grade crossing elimination, Terrace, Case No. 5472. $3,060,000. Plans under way.

N. Y., Burdett—Lehigh Valley R. R. Co., R. E. Patterson, ch. engr., 425 Brighton St., Bethlehem, Pa., grade crossing elimination at Lake Ave., Case No. 5986. $100,000. Plans under way.

N. Y., Cambridge-Salem—Delaware & Hudson R.R. Corp., P. O. Ferris, ch. engr., foot of State St., Albany, reconstruction, grade crossing elimination, at Hy. 5293. $150,000. Plans under way.

N. Y., Camillus—Fairmont—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 5318. $250,000. Design money available.

N. Y., Center Moriches and West Hampton—Long Island R.R. Co., C. E. Adams, ch. engr., Penna. Sta., New York, reconstruction, grade crossing elimination at Hy. 8039. $240,000. Plans under way.

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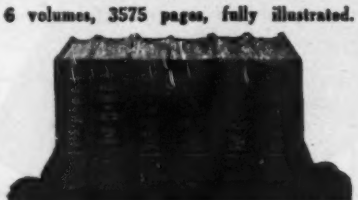

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POSTWAR PROJECTS (Cont'd.)

N. Y., Chaumont—Depauville — New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 1253. $150,000. Design money available.

N. Y., Chester Village—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., reconstruction, grade crossing, elimination at Hy. 1802. $190,000. Design money available.

N. Y., Churchville—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination, Buffalo St., Case No. 4660. $253,200. Plans under way.

N. Y., Clarence—New York Central Sys., S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at Main St., Case No. 5390; Salt Rd. $365,000. Plans under way.

N. Y., Comstock-Fort Ann—Delaware & Hudson R. R. Corp., P. O. Ferris, ch. engr., foot of State St., Albany, reconstruction, grade crossing elimination at Hy. 1224, $190,000. Design money available.

N. Y., DeKalb Junction—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, grade crossing elimination at Bairds, Case No. 8143, $142,900. Design funds available.

N. Y., Dobbs Ferry—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at Ashford Ave., Case No. 5970. $448,265. Plans complete.

N. Y., Durhamville—Rome—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 1157. $180,000.

N. Y., East Chatham-Queechy Lake—Baltimore & Ohio R.R. Sys., A. C. Clarke, ch. engr., Baltimore and Charles Sts., Baltimore, Md., reconstruction, grade crossing elimination at Hy. 9227. $230,000. Plans complete.

N. Y., East Randolph—Salamanca — Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., reconstruction, grade cross elimination at Hy. 8328. $150,000. Design money available.

N. Y., Elba—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, grade crossing elimination at Barre Center, Elba Pt. 4, Case No. 6586, $301,900. Design funds available.

N. Y., Elmira—Lehigh Valley R. R. Co., R. E. Patterson, ch. engr., 425 Brighton St., Bethlehem, Pa., and Delaware, Lackawanna & Western R. R. Co., G. A. Phillips, ch. engr., Passenger Terminal, Hoboken, N. J., grade crossing eliminations at Thorston St. and Grand Central Ave., Case No. 5339. $330,243. Plans under way.

N. Y., Elmsford—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at White Plans Rd., Case No. 4894. $312,200. Plans under way.

N. Y., Endicott—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., reconstruction, grade crossing elimination, at McKinley Ave. $325,000. Plans under way.

N. Y., Fairport—New York Central System, (West Shore R.R.), S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, grade crossing elimination at Main St., SH 574, Case No. 9942, $400,000. Design funds available.

N. Y., Falconer—Erie R. R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., grade crossing elimination, S. Wark St., Case No. 9209. $211,200. Plans under way.

N. Y., Farmingdale—Long Island R.R. Co., C. E. Adams, ch. engr., Penna Sta., New York, grade crossing eliminations, Massapequa Rd., Case No. 5443, Farmingdale Rd., Case No. 5979 and Heisser Lane, Case No. 6606. $396,900. Plans complete.

N. Y., Fassett-Southport—Pennsylvania R.R., J. L. Gressit, ch. engr., Broad St. Sta., Phila., Pa., reconstruction, grade crossing elimination at Hy. 1561. $260,000. Plans complete.

N. Y., Fort Plain Village—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. No. 1866. $160,000. Design money available.

N. Y., Fultonville-Fonda—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 864. $175,000. Plans complete.

N. Y., Fulton—Dpt. P. Wks., State Office Bldg., Albany, lowering culvert, Barge Canal. $51,400. Plans under way.

N. Y., Glendale—Long Island R.R. Co., C. E. Adams, ch. engr., Pennsylvania Station, New York, 88 St.-Glendale elimination. $335,000. Plans complete.

N. Y., Gowanda Village—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., reconstruction, grade crossing elimination at Hy. 1037. $200,000. Design money available.

N. Y., Haverstraw—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at New Main St. and West Side Ave., Case No. 6622. $402,155. Plans complete.

N. Y., Hawthorne—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing eliminations at Broadway and Cross St., Case 5969. $408,700. Plans complete.

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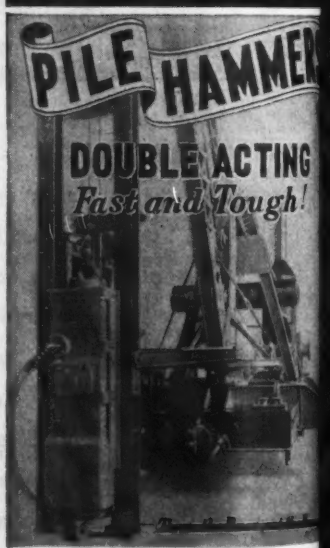

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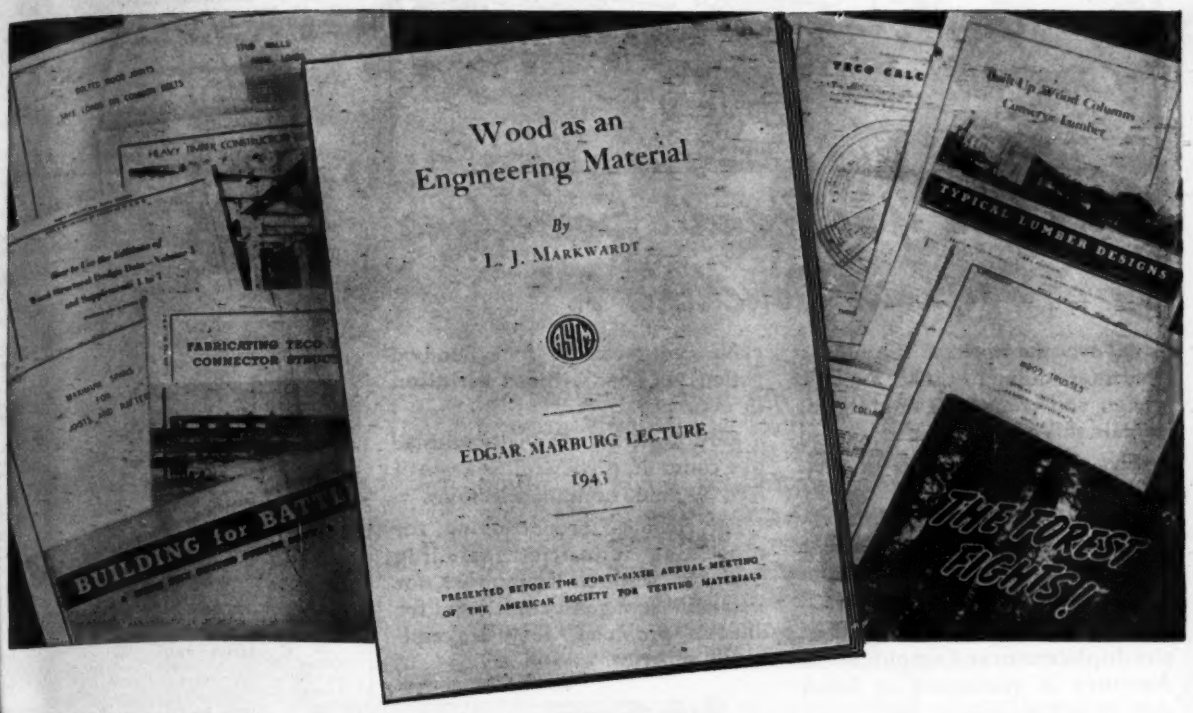

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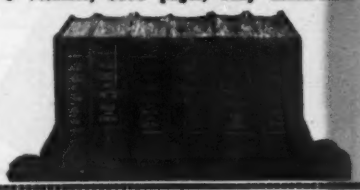

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POSTWAR PROJECTS (Cont'd.)

N. Y., Chaumont—Depauville — New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 1253. $150,000. Design money available.

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N. Y., Endicott—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., reconstruction, grade crossing elimination, at Mc-

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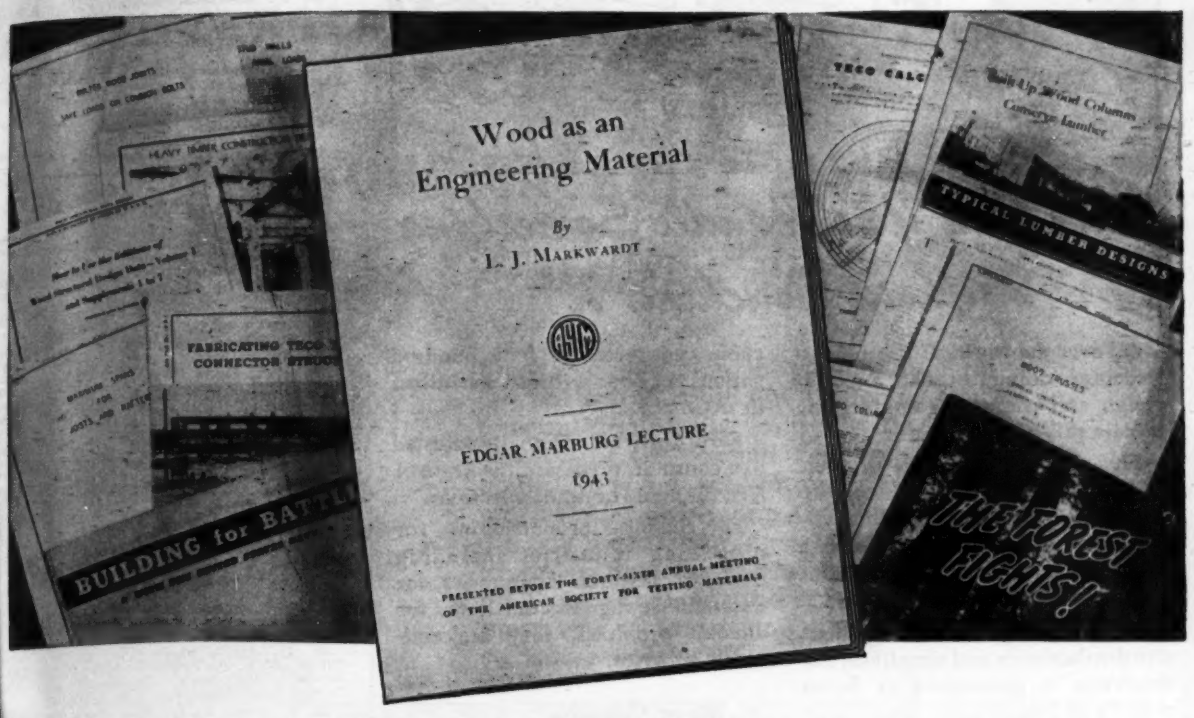

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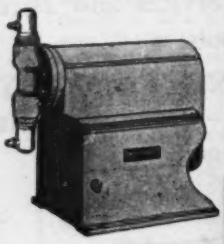

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POSTWAR PROJECTS (Cont'd.)

N. Y., Henrietta—Lehigh Valley R.R. Co., R. E. Patterson, ch. engr., 425 Brighton St., Bethlehem Pa., grade crossing elimination at Cedar Swamp Rd., Case 6015, $151,000. Plans under way.

N. Y., Henrietta—Lehigh Valley R.R. Co., R. E. Patterson, ch. engr., 425 Brighton St., Bethlehem, Pa., grade crossing elimination, Mt. Hope Ave., Case No. 6598. $125,000. Design funds available.

N. Y., Herkimer—Dpt. P. Wks., State Office Bldg., Albany, raising Washington St. Bridge E-34, Barge Canal. $90,000. Design money available.

N. Y., High Falls-Stone Ridge—New York, Ontario & Western R. R. Co., F. J. Meyer, ch. engr., Middletown, reconstruction, grade crossing elimination, at Hy. 1464, $150,000. Design money available.

N. Y., Hollowville—Crary ville—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 763. $200,000. Design money available.

N. Y., Kingston—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, and New York, Ontario & Western R. R. Co., F. J. Meyer, ch. engr., Middletown, reconstruction, grade crossing elimination at Washington Ave., Hy. 5173 Ext. $300,000. Design money available.

N. Y., Kingston-Hurley—New York, Ontario & Western Ry. Co., F. J. Meyer, ch. engr., Middletown, reconstruction, grade crossing elimination at Hy 1373. $150,000. Design money available.

N. Y., Lafayette-Pompey—Delaware, Lackawanna & Western R. R. Co., G. A. Phillips, ch. engr., Passenger Terminal, Hoboken, N. J., reconstruction, grade crossing elimination at Hy. 8332, $200,000. Design money available.

N. Y., Lewiston Heights—Lewiston—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 5590. $300,000. Design money available.

N. Y., Little Falls—Dpt. P. Wks. State Office Bldg., Albany, raising Hanson Ave. Bridge E-33, Barge Canal. $75,000. Design money available.

N. Y., Little Falls—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination, at Hy. 831. $150,000. Design money available.

N. Y., Marcy Hill—Trenton—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 911. $120,000. Design money available.

★**N. Y., Middletown—Cuddleback**—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., reconstruction, 3 grade crossing elimination at Hy. 313. $540,000. Design money available.

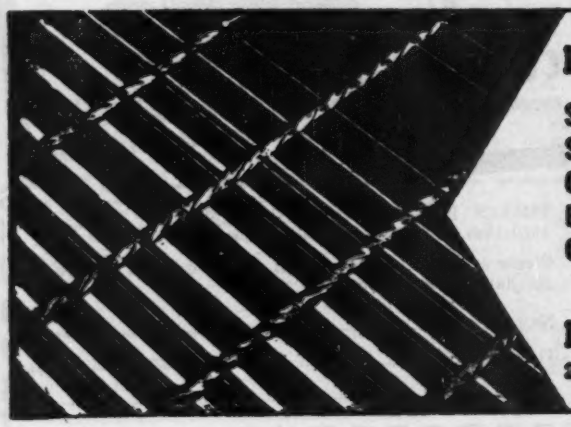
N. Y., Middletown-Montgomery—Erie R. R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., reconstruction, grade crossing elimination at Hy. 499, $180,000. Design money available.

N. Y., Mindenville—Dpt. P. Wks., State Office Bldg., Albany, lengthening Bridge E-30, Barge Canal. $25,000. Plans complete.

N. Y., Mineola—Long Island R. R. Co., C. E. Adams, ch. engr., Pennsylvania Station, New York, reconstruction, grade crossing elimination at Nassau Blvd. $220,000. Design money available.

N. Y., Montgomery-Goshen—Erie R. R. Co., J. S. Smith, ch. engr., Midland Bldg., Cleveland, O., reconstruction, grade crossing elimination at Hy. 65, $150,000. Design money available.

N. Y., Moriches-Center Moriches — Long Island R. R. Co., C. E. Adams, ch. engr., Pennsylvania Station, New York, reconstruction, grade crossing elimination at Hy. 540, $200,000. Design money available.



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POSTWAR PROJECTS (Cont'd.)

N. Y., New Scotland—Wolf Hill—New Y Central System, S. E. Armstrong, ch. en 466 Lexington Ave., New York, reconstruct grade crossing elimination at Hy. 366, 1 000. Design money available.

N. Y., Obi-Cuba—Erie R. R. Co., J Smith, ch. engr., Midland Bldg., Cleve O., reconstruction, grade crossing elimina at Hy. 965, $150,000. Design money avail

N. Y., Odessa-Mecklenburg—Lehigh Va R. R. Co., R. E. Patterson, ch. engr. Brighton St., Bethlehem, Pa., reconstruc grade crossing elimination at Hy. 1655, 1 000. Design money available.

N. Y., Oswego—Dpt. P. Wks., State O Bldg., Albany, raising Bridge O-14, Ba Canal. $70,000. Plans complete.

N. Y., Oswego—Dpt. P. Wks., State O Bldg., Albany, lowering culvert, Barge Ca $22,300. Plans under way.

N. Y., Pulaski—Williamstown—New Y Central System, S. E. Armstrong, ch. en 466 Lexington Ave., New York, reconstr tion, grade crossing elimination at Hy. $170,000; at Hy. 1287, $180,000. Design ma available.

N. Y., Reynolds Corners-Ft. Edward—D ware & Hudson R. R. Corp., P. O. Ferris engr., foot of State St., Albany, reconstruc grade crossing elimination at Hy. 1748, 1 000. Design money available.

N. Y., Rome—Dpt. P. Wks., State O Bldg., Albany, converting N.Y.O. & W R bridge, E-53 to lift bridge, Barge Ca $25,000. Plans under way.

N. Y., Rotterdam—Dpt. P. Wks., State fice Bldg., Albany, raising N. Y. Cen Bridge, E-17, Barge Canal. $150,000. P under way.

N. Y., Rye — New York, New Haven Hartford R.R. Co., Grand Central Termi E. E. Oviatt, ch. engr., New Haven, Co reconstruction, grade crossing elimination Hy. 5373. $170,000. Design money availabl

N. Y., Schenectady—Guilderland—New Y Central System, S. E. Armstrong, ch. en 466 Lexington Ave., New York, reconstruct 3 grade crossing eliminations at Hy. $340,000. Design money available.

N. Y., Sag Harbor-Easthampton—L Island R. R. Co., C. E. Adams, ch. en Pennsylvania Station, New York, reconst tion, grade crossing elimination at Hy. $90,000. Design money available.

N. Y., Sylvan Beach—Dpt. P. Wks., St Office Bldg., Albany, raising N. Y. O. & R. R. Bridge, E-62, Barge Canal. $100, Plans under way.

N. Y., Trenton—Remsen—New York Cen System, S. E. Armstrong, ch. engr., 466 L ington Ave., New York, reconstruction, gr crossing elimination at Hy. 5345. $50,000. sign money available.

N. Y., Utica—Dpt. P. Wks., State O Bldg., Albany, raising Bridge, E-44, Ba Canal. $115,000. Plans complete.

N. Y., Voorheesville—New Salem—New Y Central System, S. E. Armstrong, ch. en 466 Lexington Ave., New York, reconstruc grade crossing elimination at Hy. 946, 1 000. Design money available.

N. Y., Walden Village—New York Cen System, S. E. Armstrong, ch. engr., 466 L ington Ave., New York, reconstruction, gr crossing elimination at Hy. 1539. $200,000. sign money available.

N. Y., Waterford — Dpt. P. Wks., St Office Bldg., Albany, raising D & H Ry E-1, Barge Canal. $350,000. Design m available.

N. Y., Westfield—New York Central Sy S. E. Armstrong, ch. engr., 466 Lexing Ave., New York, reconstruction, grade cr ing elimination at Hy. 5703. $320,000. De money available.

O., Barberton—City, reconstructing 1 ducts, $80,000. H. Bushey, City Hall, city e

★ **O., Dayton**—City, bridges. $1,325,000. C Baker, city engr.

O., Elyria—City, 9 bridges. $238,000. J. Powell, city engr.

O., Lima—City, railroad grade separa project. $100,000. J. F. Cupp, city engr.

O., Lorain—City, grade elimination proj Over $100,000. H. F. Alexander, City E city engr.

O., Middletown—City, Shafter St. gr crossing elimination project, $288,500. L Fiefenbach, City Hall, city engr.

O., Wooster—Bd. Comrs. Wayne Co Wooster, repairing approx. 117 bridges of 20 ft. spans. $363,000. W. Metzler, Wooster engr.

Tex., Houston—City, 300 ft. rein.-con hicle and pedestrian bridge, 44 ft. wide, ac Buffalo Bayou, on Milam St. $225,000.

†**Wisconsin and Minnesota** — Pub. R Admin., 18 and F Sts. N.W., Wash., 2 mi. interstate bridge, approaches on 2 over St. Croix River between Hudson, and Lakeland, Minn.

Alta., Athabasca — Municipality, br across to north side of river. $75,000.

OSTWAR PROJECTS (Cont'd.)

N. B., **Saint John**—Municipality, A. Wasson, ayor, Mill St. viaduct. $200,000.

Nova Scotia—Municipality of Halifax, sub- way linking Halifax with Dartmouth, $2,- 0,000.

Ont., Barrie—Simcoe Co. Rd. Com., mak- g plans bridge, $78,000. E. W. Jones, c/o wner, engr.

Ont., Brockville—Municipality, C. G. Mac- drum, mayor, subway. $50,000.

Ont., London—Middlesex Co., rebuilding 167 bridges, $1,142,000. W. R. Smith, ondon, engr.

Ont., St. Catherines—Grantham Twp., K. V. rown, clk., 1485 King St., bridge construc- on, $30,000.

Ont., Simcoe—Simcoe Co., bridge recon- ruction. $76,000. E. W. Jones, County dg., engr.

ROADS

Alabama—Pub. Rds. Admin., 18 and F n. N.W., Wash., 25, D. C., 4.5 mi. new route tween point southeast of Centerville and int northwest of Brent, involving route ound Centerville and new bridge over haba River; 18 mi. relocation for U. S. 31 direct alinement between point approx. 3 . south of Greenville and Deavenport; 14 . relocation for U.S. 78 from point about mi. west of Anniston via Goldwater Gap point east of Oxford involving alternate te around Anniston and Oxford; 20 mi. re- ation for U.S. 31 on more direct alinement tween point near Cullman and Hartselle; 8 mi., new route between Bessemer and ebuck, involving alternate route around Bir- gham on south and east; 22 mi. new route tween Bessemer and Roebuck, involving an rnate route around Birmingham on west d north; 11 mi. relocation for U.S. 231 on re direct alinement, passing near Dothan west; 6 mi. new route on more direct aline- nt around Dothan on south; imprv. 15 mi. 231 between Orion and point southeast Troy, paving near Troy on west; 8 mi. new es around Huntsville on north, west and st; 13.1 mi. relocation on more direct aline- nt of U.S. 90 between Theodore and point Government Street in Mobile; 9.5 mi. re- ation for U.S. 43 between point near Prich- d and a point near Navco, paving near Mo- e on west; 17 mi. new route between point U.S. 80 east of Montgomery, southerly, sterly and northerly to point on U.S. 31 ssing near Montgomery on the east, south d west; 14.5 mi. new route on more direct nement between point on U. S. 80 near ecow and point near Cuba; 35 mi. reloca- n on more direct alinement of U.S. 11 be- en point southwest of Tuscaloosa and ckville, passing near Tuscaloosa on south.

Arizona—Pub. Rds. Admin., 18 and F Sts. W., Wash., 25, D. C., 25 mi. freeway with der network at Phoenix, incl. entrance cir- nferential and distr. routes and publicly ned off-street parking facilities; 10 mi. eway with feeder network at Tucson, incl. rance, circumferential and distr. routes, d publicly owned off-street parking facili- s.

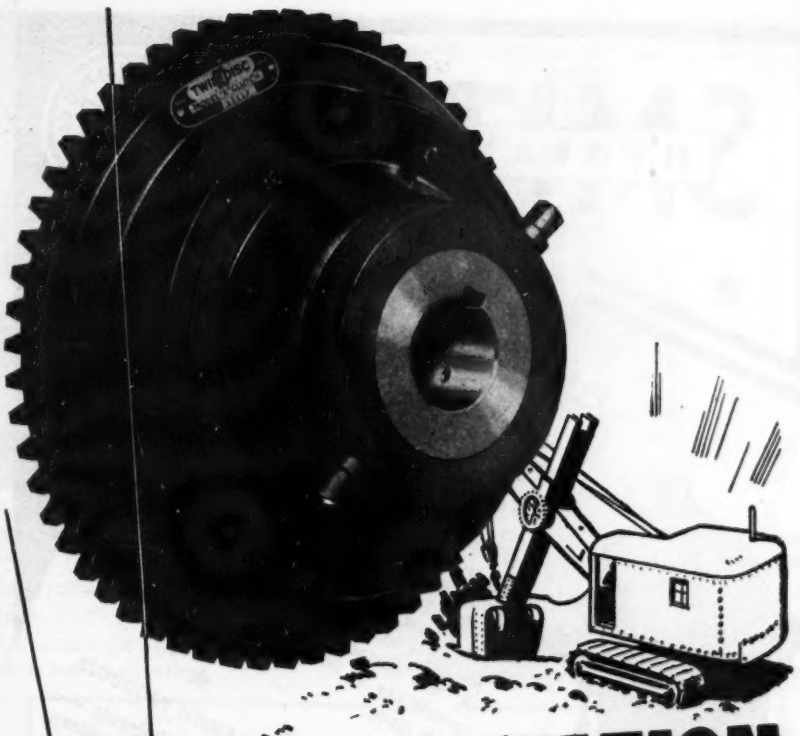
Arkansas—State Hy. Dpt., W. W. Mitch- ell, hy. engr., Little Rock, elimination and aration grade crossings, $20,000,000.

California—Pub. Rds. Admin., 18 and F N.W., Wash., 25, D. C., 42 mi. four proj- s involving completion Bayshore Freeway m the San Francisco-Oakland Bay Bridge west side of San Francisco Bay via San a, Redwood City, Moffett Field and San e to connect with present route southeast San Jose; 32 mi. new limited access hy. m point on High Street in Oakland along t shore of San Francisco Bay connecting h proposed Bayshore Freeway north of Jose, known as Eastshore Freeway and bypass congested urban and industrial a; 44.5 mi. four projects for development way from near Universal City through the ness section of Los Angeles southeasterly Irvine; 26 mi. development of Sepulveda d., from northwest of San Fernando to tinella Blvd. south of Culver City; 4.1 freeway from American River to Ben Ali theast of Sacramento; 18.6 mi. 3 projects freeway from east end of Oakland-San ncisco Bay Bridge through Oakland and lmond to Carquinez bridge.

Calif., Auburn—Placer Co., Court House, onstructing Truckee-Brockway Rd. $161,- J. A. Shields, Auburn, co. engr.

Calif., Santa Rosa—Sonoma Co., Court house, onstructing Porter Creek & Petrified For- roads, $104,000; road from Valley Ford to ega Bay, $165,000; imprv. Occidental- estone Rd. $51,000; relocating road be- en Freestone and Watson school, $38,000.

Colorado—Pub. Rds. Admin., 18 and F Sts. ., Wash., 25, D. C., 3.2 mi. completion design for enlargement and lining hy. el with either 2 single track tunnels or le-track tunnel with mechanically con- led traffic flow on U.S. 6 under Loveland ; 26 mi. alternate north-south route east Colorado Springs to be a 4-lane limited ss hy.; 3 mi. alternate route with limited



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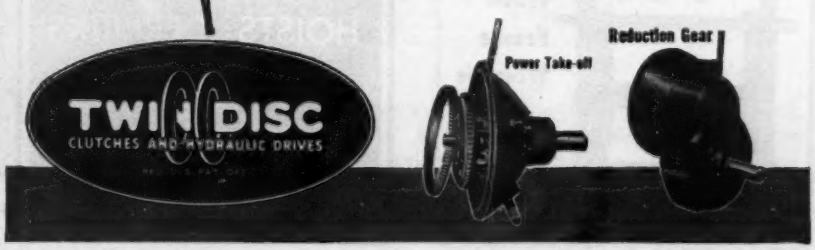

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POSTWAR PROJECTS (Cont'd.)

access through Rifle on U.S. 6 and 24 involving new bridge over Rifle Creek and possible relocation of railroad facilities; 11.5 mi. development alternate north-south route east of Colorado and Southern Railway involving new bridge over Apishapa River and elimination 2 existing railroad grade separations at Aguilar on U.S. 85 and 87; 7.5 mi. north and south route through Pueblo to be limited access 4-lane hy. with bridge over Arkansas River, grade separations at all main cross streets and at all main railroad intersections; 7 mi. new north and south route east of Greenhorn on U.S. 85 and 87 to be 2-lane limited access hy. on better grades and alinement; 6.2 mi. new route northerly from 18 St. and Fox St., Denver, or by extension of Bway. viaduct to connection with State Hy. 185; imprv. to be divided 4-lane hy. and access will be limited under freeway law; 18 mi. reconstruction Buchtel Blvd., with Denver from South University Ave. to South Colorado Blvd. at 4-lane limited access hy. and study of continuation of route to State Hy. 83 south of Parker; 4.8 mi., relocation of U.S. 285 as limited access hy. from West Alameda and Sheridan Blvd. at west limit of Denver to 3.5 mi. east of Morrison; 1 mi. relocation U.S. 85-87 as limited access hy. through Trinidad, involving 2,000 ft. viaduct over the Atchison, Topeka & Santa Fe Ry., Purgatoire River and Colorado and Southern Ry.; 2 mi. development of east entrance to Fort Collins, incl. railroad grade separation structure and bridge on relocation of State Hy. 14; 1 mi. alternate route as limited access hy. through Palisade; 3.2 mi. relocation U.S. 85 through Greeley with limited access outside city.

†**Delaware**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 1.5 mi. new relief route as an extension Governor Prints Blvd. between Claymont and Delaware-Pennsylvania state line, structures over railroads, streams and hys. will be required.

†**Georgia**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 50.1 mi. 6 projects involving an alternate to US 41 and development existing route between Elizabeth and Calhoun; 89.5 mi. 8 projects on US 17 between the Georgia-Florida state line and Darien with alternates in vicinity of Brunswick; 74 mi. 10 projects on US 17 between Darien and Georgia-South Carolina state line with alternates in vicinity of Savannah.

†**Kansas**—Pub. Rds. Admin., 18 and F Sts. N. W., Wash., 25, D. C., 8 mi. relocation US 66 between Baxter Springs and Riverton, 9 mi., circumferential route around west and north sides of Wichita.

†**Kentucky**—Pub. Rds. Admin., 18 and F Sts. N. W., Wash., 25, D. C., 6.5 mi. new route on more direct alinement between Catlettsburg and Cannonsburg.

†**Louisiana**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 36 mi. widening, straightening Bayou Sara Rd. within and north of Baton Rouge; 22.5 mi. widening, relocating US 90 between Sulphur and Iowa, incl. new route through the north part of Lake Charles involving bridge over Calcasieu River; 3.8 mi. widening, relocating of US 11 from Market and Texas Streets in Shreveport easterly; 17.7 mi. widening, relocating US 71 between Bossier City and Minden; 37.5 mi. new east-west route through New Orleans from point near Huey P. Long Bridge over the Mississippi River along the southern shore of Lake Ponchartrain to junction with US 11 near southerly end Ponchartrain Bridge to junction with US 90 near the present junction US 11 and 90, also spur from point on the new route near crossing of New Basin Canal across New Orleans and Mississippi River to point in Gretna.

†**Maine**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 5.8 mi. imprv. US 302 between Foster's Corner and Gray Corner; 14 mi. alternate route around Augusta on west and north; 7 mi. alternate route around Winslow involving new crossing of Sebasticook River; 22 mi. imprv. US 202 in three separate sections between the Maine-New Hampshire state line at Rochester and Foster's Corner.

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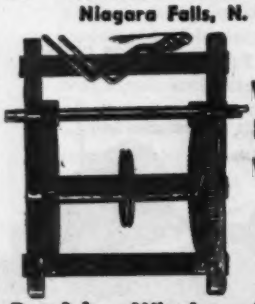

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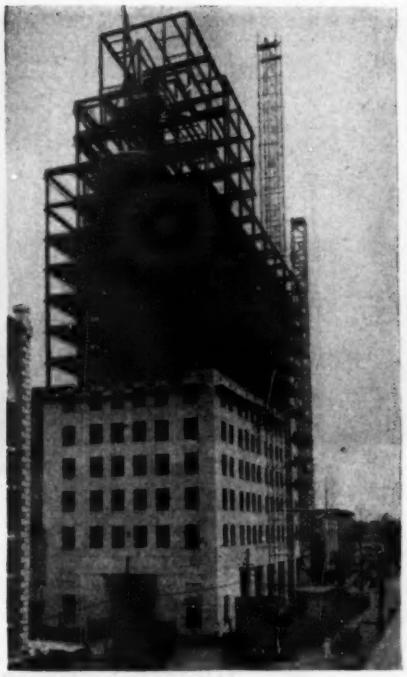

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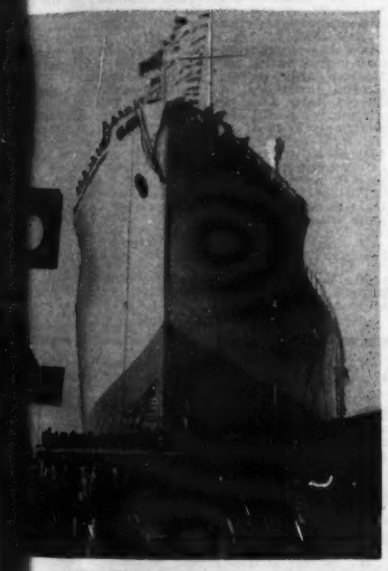

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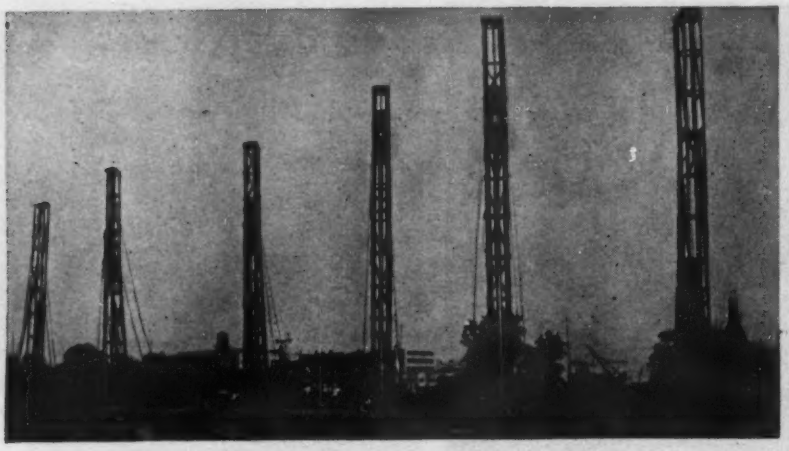

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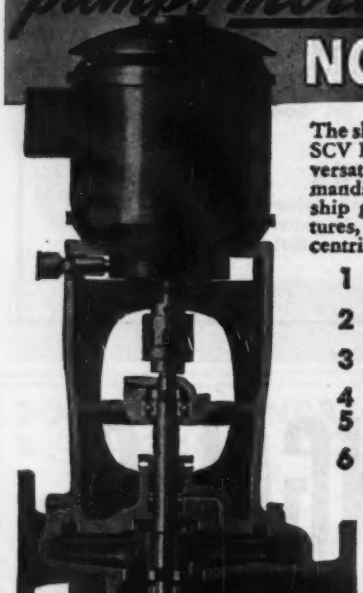

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POSTWAR PROJECTS (Cont'd.)

9 mi. two projects for an alternate route around Freeport Village; 44 mi., new route west of US 1 from Kittery to Westbrook; 3 mi. relocation of US 1 involving causeway across tidewater between Machias and East Machias; 1 mi. alternate route around the village of West Pembroke; 3.7 mi. relocation in Pembroke Village avoiding dangerous alinement.

†**Minnesota**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 2.5 mi. alternate route on US 2 through Cass Lake; 2 mi. alternate route on Trunk Hy. 7 through Montevideo; 3.5 mi. alternate route on US 2 from east entrance to Red Wing; 2.3 mi. three projects on Hiawatha Ave. and extension between 34 St. and junction on 5 St. south and 8 Ave. south, Minneapolis; 1.3 mi. two projects on west side Ring St. from intersection 10 and Plymouth southerly to Grant, Minneapolis; 8.7 mi. 2 projects on Belt Line north, east and south of Austin; 2.9 mi. Mississippi St. from the North city limit of St. Paul to University Ave.; 3.4 mi. development of northeasterly entrance to St. Paul from vicinity of White Bear to US 12; 3.8 mi. development between Trunk Hy. 100 and North St. Paul; 2.6 mi. North Side Circuit Way from Junction of Maria and Hudson Rd. to junction of Western and University Ave., St. Paul; 1.1 mi. West Side Circuit Way from Pennsylvania Ave. near Minnehaha St. to junction of Washington and Kellogg, St. Paul; 2 mi. 2 projects on connection between South Snelling Ave., St. Paul and Fort Snelling and Meadota Bridge areas, south of Mississippi River; 8 mi. alternate route for US 65 through Faribault; 3 mi. alternate route for US 53 into Duluth; 2 mi. alternate route for US 52 through St. Cloud, incl. new bridge over Mississippi River; 5.5 mi. 2 projects on US 10 through Sauk Rapids; 2 mi. 2 projects involving interstate bridge and approaches on US 12 over St. Croix River between Lakeland, Minn. and Hudson, Wis.

★**New Jersey**—State Hy. Dpt., State House Annex, Trenton, constr. Route 28 in Annandale, Hunterdon Co. $800,000.

†**New Mexico**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 4 mi. development alternate route for US 85 on south side of Santa Fe; 3 mi. relocation portions US 64-84-285 through Santa Fe; 8.5 mi. 3 projects incl. alternate routes for US 66 through Gallup and new connection with US 666 exten. northerly; 6.5 mi. alternate route on US 85 into and through Las Vegas; 32 mi. alternate route on US 85 from Algodones southerly east of Atchison, Topeka and Santa Fe Ry., through or west of Albuquerque to Isleta; 5 mi. alternate route on US 66 east of Albuquerque connecting with US 85 in city or outside; 7.5 mi. alternate route on US 60-70-84 through Clovis; 8 mi. alternate route on US 8-85 through Las Cruces and connection with US 70.

N. Y., Batavia—City, imprv. Pearl St. $59,000. State Planning Aid funds allocated.

N. Y., Elmsford—Village, permanent road imprvs. $45,000. State Planning Aid funds allocated. CD 11/24—ENR 12/2.

N. Y., Nyack—Village, street imprvs. $38,900. State Planning Aid funds allocated.

N. Y., Warsaw—Village, paving 4 mi. streets $160,000. State Planning Aid funds allocated.

†**Ohio**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 54 mi. 3 projects involving imprv. U.S. 25 or the selection of new route from Ohio River and Cincinnati to point just north Dayton.

O., Barberton—City, City Hall, widening, resurfacing and new street construction. $453,000. H. Bushey, City Hall, city engr.

O., Conneaut—City, street paving, resurfacing. $150,000. W. V. Kantola, city engr.

O., Elyria—City, street widening, resurfacing. $300,000. J. M. Powell, city engr.

★**O., Hamilton**—City, paving Washington Blvd., $130,800; city-wide curb and gutter construction program, $160,000; sidewalk imprv. project, $140,000; street imprvs., $231,500; imprv. sections Main St. and Eaton Ave., $262,000. A. A. Smalley, City Hall, city engr.

O., Kent—City, street imprv. program. $235,493. J. G. Osborne, city engr.

O., Lorain—City, sidewalk and street construction. Over $100,000. H. F. Alexander, City Hall, city engr.

†**Oklahoma**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 5 mi. project involving alternate of U.S. 66 east and south of Clinton; 10 mi. project involving alternate of U.S. 66 south of El Reno; 7 mi. project on U.S. 70 and 77 involving belt line north of Ardmore; 14 mi. project involving alternate of U.S. 69 and 270 through McAlester; 40 mi. project on U.S. 64, 66 and 75 involving belt line on east, south and west of Tulsa.

†**Oregon**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 42 mi. new route on more direct alignment and better grades east of Fort Klamath on U.S. 97 in order to avoid high summit at Sun Pass; 32.9 mi. major relocation Columbia River Hy. (U.S. 30) in practically continuous section between Bridal Veil and the Dalles, following as closely as possible along Columbia River.

POSTWAR PROJECTS (Cont'd.)

†**Rhode Island**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D.C., 2.7 mi. 2 projects for development of restricted access hy. as a circumferential route around northerly side of metropolitan area of Providence connecting with a similar route in Massachusetts; 2.7 mi. new route as divided restricted access expressway from Memorial Sq., Providence to Mineral Spring Ave., North Providence as relief route for Louisquisset Pike; 1.9 mi. new route as restricted access expressway from 0.5 of a mile north of Mineral Spring Ave., North Providence to proposed project above near the Providence city line in Wayskuck District as reli f route for Douglas Pike; 8.5 mi., 2 projects involving an alternate route as a divided hy. with grade separations in vicinity of Wyoming, Hope Valley and Hopkinton City.

†**South Carolina**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 16 mi. belt line around south, east and north side of Anderson; 20 mi. connection between U.S. 52 and U.S. 17 north and west of Charleston; 20 mi. belt line completely around Greenville; 30 mi. belt line completely around Columbia; 6 mi. alternate of U.S. 29 through Spartanburg; 15 mi. alternate to U.S. 521 around east side of Sumter; 6 mi. alternate to U.S. 21 around the east side of Rock Hill.

†**Vermont**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 1.45 mi. alternate route on U.S. 7 east of Vergennes; 11.4 mi. development of U.S. 5 between Bradford and Wells River; 18.7 mi. imprv. U.S. 2 incl. relocation on south side of Winooski River between Williston and Duxbury.

†**Virginia**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 32 mi. new belt-line distribution road with limited access from north of Richmond to south of Petersburg; 4.5 mi. new east-west route belt-line distribution road with limited access north of Suffolk; 12.5 mi. new belt-line distribution road with limited access north of Roanoke and Salem; 11 mi. new belt-line distribution road with limited access east and south of Lynchburg; 4 mi. new belt-line distribution road with limited access south and west of Danville; 6 mi. new belt-line distribution road with limited access east of Harrisonburg; 6.5 mi. new belt-line distribution road with limited access north and west of Charlottesville; 5.5 mi. new belt-line distribution road with limited access east of Staunton; 8.5 mi. new belt-line distribution road with limited access on east, south and west of Winchester; 1.75 mi. new belt-line distribution road with limited access west of Martinsville.

†**Washington**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 2.3 mi. new route through Vancouver via Broadway; 1.8 mi. 2 projects for imprv. existing route west of Lake Washington Bridge in Seattle; 9.5 mi. alternate route through the southerly and easterly part of Tacoma; 2.5 mi. new east-west route through Spokane; 3 mi. 2 projects for new north-south route through Bellingham.

†**West Virginia**—Pub. Rds. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 7 mi. alternate route around Morgantown on east; 4.6 mi. alternate to U.S. 22 between Hollidays Cove and West Virginia-Pennsylvania state line.

Ont., Simcoe—Simcoe Co., grading, gravelling 144 mi., $492,000; bituminous mulch surfacing 36 mi., $201,000. E. W. Jones Co. Bldg., engr.

EARTHWORK—IRRIGATION DRAINAGE—WATERWAYS

†**Arkansas**—U. S. Eng., West Memphis, ★ addnl. floodway and levee construction on Arkansas and White Rivers, $251,000,000.

Calif., Oakland—City, City Hall, dredging, imprv. boating facilities, Lake Merritt, $160,000.

Maine—State Rivers & Harbors Comn., State House, Augusta, dredging Josias River. $30,000.

Me., Isle au Haut—State, Rivers & Harbors Comn., State House, Augusta, dredging harbor Isle au Haut Thoroughfare. $30,000.

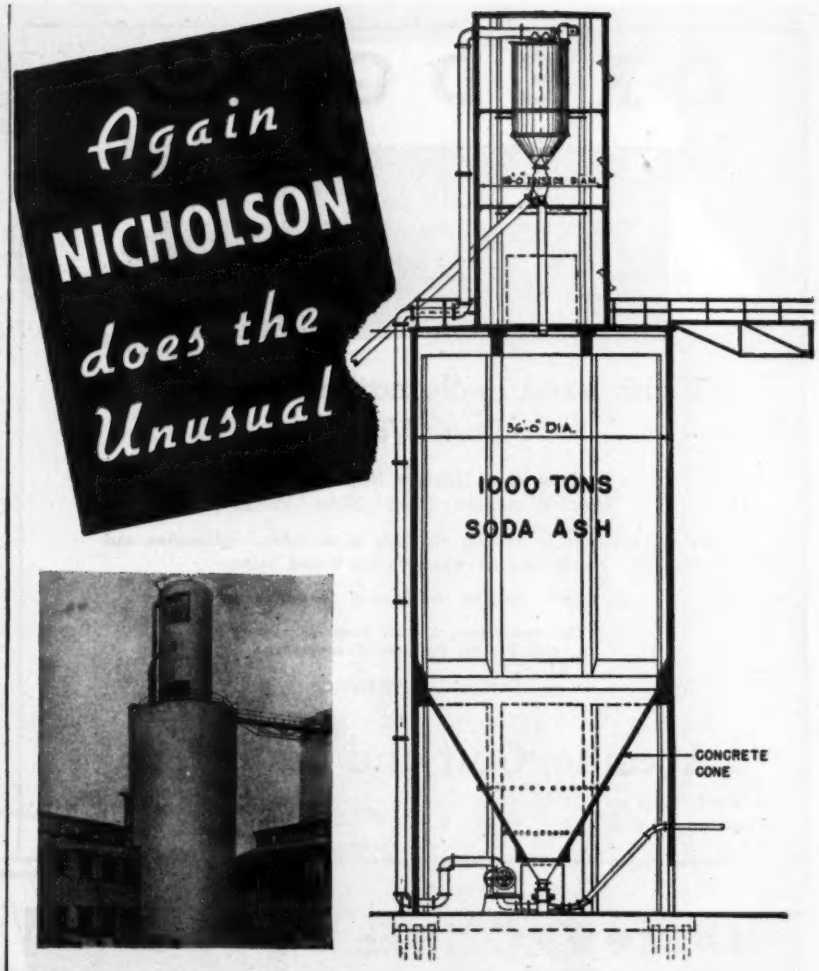
Me., Northeast Harbor—State, Rivers & Harbors Comn., State House, Augusta, dredging harbor. $95,000.

†**N. J., Cape May**—City, jetty constr. project ★ along beach-front in order to curb beach erosion. $3,000,000.

†**New York**—U. S. Eng., Chimes Bldg., ★ Syracuse, earth filled detention type dam, Syracuse Reservoir 4A, on east branch of Onondaga Creek, approx. 5 mi. south of Onondaga Indian Reservation, Onondaga Co. $1,271,000.

†**New York**—U. S. Eng., Chimes Bldg., ★ Syracuse, earth filled dam on Genesee River near Mt. Morris with small permanent pool providing electric power for operation of a small plant. $4,030,000.

†**N. Y., Addison**—U. S. Eng., Chimes Bldg., Syracuse, straightening Canisteo River, removing dam, constructing levee and bridge. $22,500.



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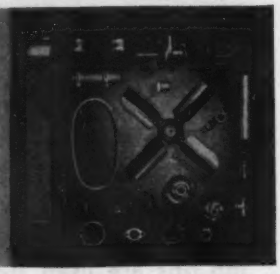

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POSTWAR PROJECTS (Cont'd.)

†**N. Y., Almond**—U. S. Eng., Chimes Bldg., Syracuse, imprv. Canacadea Creek channel, $59,300.

†**N. Y., Auburn**—U. S. Eng., Chimes Bldg., Syracuse, imprv., deepening channel from Owasco Lake to an existing dam, constructing new dam and regulated operation of lake levels. $114,000. Plans under way.

†**N. Y., Bath**—U. S. Eng., Chimes Bldg., Syracuse, levees and walls. $351,000.

†**N. Y., Canandaigua**—U. S. Eng., Chimes Bldg., Syracuse, clearing, imprv. outlet channels and lowering an outlet sill, together with regulated operation of Canandaigua Lake levels. $30,000.

†**N. Y., Canisteo**—U. S. Eng., Chimes Bldg., Syracuse, levee, reconstructing setback of exiting levees, constructing cutoff channel, bridge and check dam, $341,500.

N. Y., Caughdenoy—Dpt. P. Wks., State Office Bldg., Albany, Mohawk type dam, barge canal. $125,000. Plans under way.

†**N. Y., Chittenango**—U. S. Eng., Chimes Bldg., Syracuse, clearing, straightening the channels of Chittenango, Limestone and Butternut Creeks, $143,000.

★†**N. Y., Davenport**—U. S. Eng., Chimes Bldg., Syracuse, earth filled dam with control gates, on Charlotte Creek. $2,990,000.

★†**N. Y., Franklin**—U. S. Eng., Chimes Bldg., Syracuse, earth filled dam with control gates, East Sidney Reservoir, on Oulfout Creek in Sidney, near here. $2,196,000. Plans under way.

★†**N. Y., Gilbertsville**—U. S. Eng., Chimes Bldg., Syracuse, earth filled dam with control gates, on Butternut Creek near here, Otsego Co. $2,671,000.

★†**N. Y., Greene**—U. S. Eng., Chimes Bldg., Syracuse, earth filled dam with control gates, on Genegantslet Creek 2 mi. west of here, Chenango Co. $2,641,000.

†**N. Y., Hammondsport**—U. S. Eng., Chimes Bldg., Syracuse, increasing capacity of Glen Brook flume, constructing check dam above flume. $165,000.

N. Y., Herkimer—Dpt. P. Wks., State Office Bldg., Albany, removing, replacing Guard Gate, No. 5, Barge Canal, $320,000. Plans complete.

†**N. Y., Hoosick Falls**—U. S. Eng., Chimes Bldg., Syracuse, wall and levee along the Hoosick River, installing pump, plant and relocating railroad spur, $147,000.

★†**N. Y., Hornell**—U. S. Eng., Chimes Bldg., Syracuse, earth filled dam with control gates, Almond Reservoir, on Canacadea Creek, approx. 2 mi. above here, Steuben Co. $2,899,000. Plans complete.

N. Y., Indian Castle—Dpt. P. Wks., State Office Bldg., Albany, raising 2 Guard Gates, No. 3, Barge Canal. $30,000. Plans under way.

N. Y., Indian Castle—Dpt. P. Wks., State Office Bldg., Albany, lowering Sills Guard Gate, No. 3, Barge Canal, $31,600. Plans under way.

†**N. Y., Ithaca**—U. S. Eng., Chimes Bldg., Syracuse, widening, leveling lower section Fall Creek, increasing channel capacity of Cascadilla Creek thru the city and constructing deck dam in Cascadilla Creek Gorge. $110,000.

†**N. Y., Jamestown**—U. S. Eng., Chimes Bldg., Syracuse, channel imprvs. of Chadakoin River, supplemented by regulated operation of Chautauqua Lake levels. $193,000.

★†**N. Y., Lancaster**—U. S. Eng., Chimes Bldg., Syracuse, dikes, walls, altering highway and bridges, elevating streets and replacing riprap along some reaches of channel. $770,000.

†**N. Y., Lisle**—U. S. Eng., Chimes Bldg., Syracuse, realigning river channel, constructing walls and levees and imprv. tributary creek, all on Tioughnioga River. $431,311. Plans under way.

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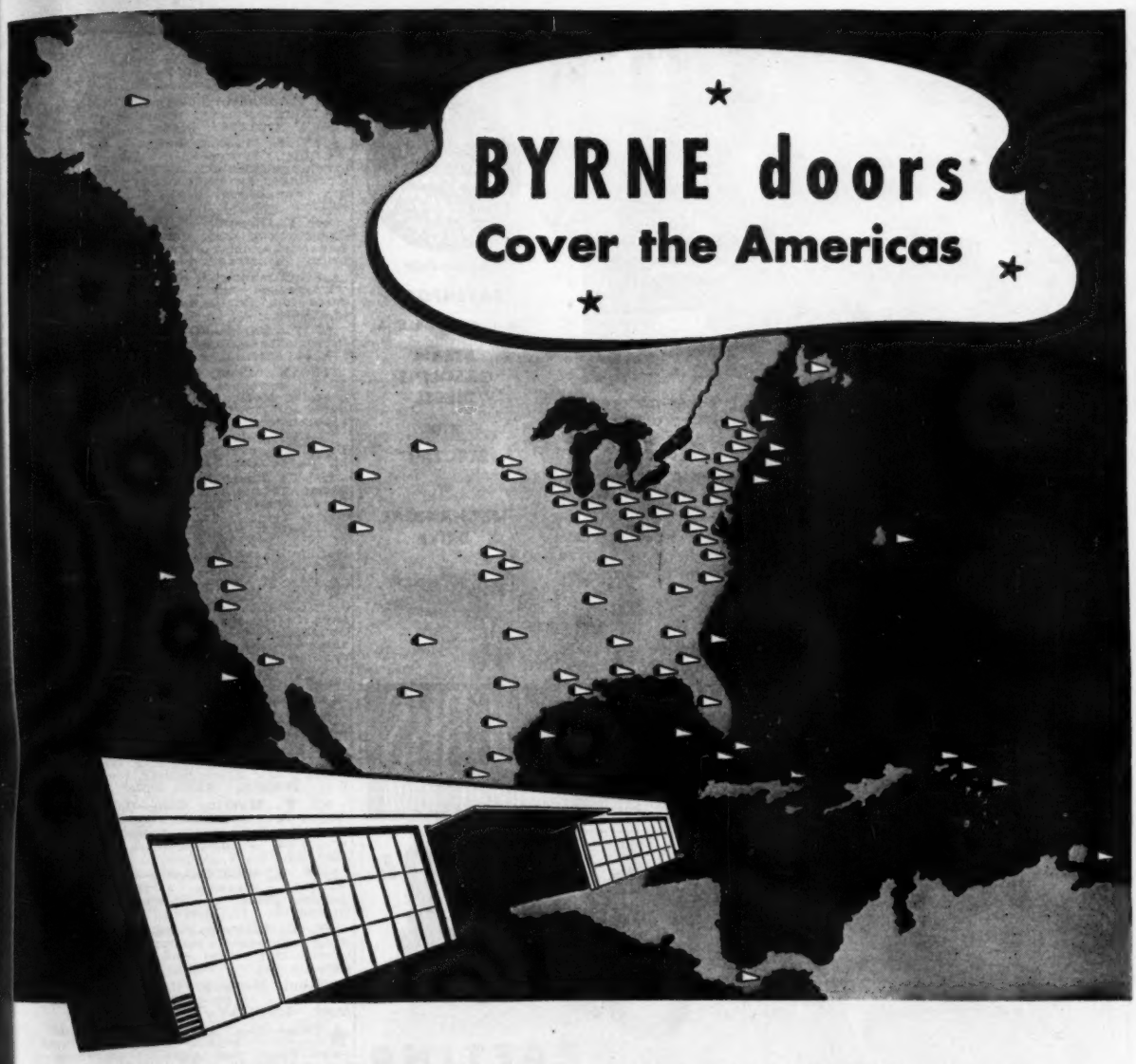

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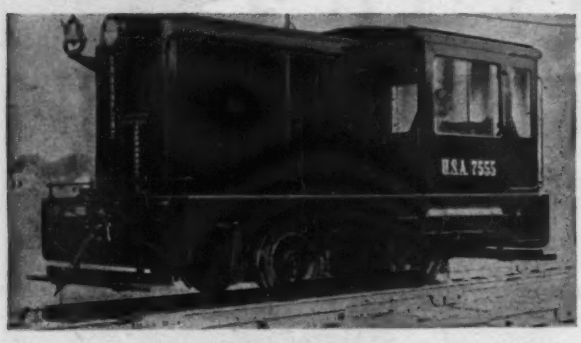

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POSTWAR PROJECTS (Cont'd.)

N. Y., Little Falls—Dpt. P. Wks., State Office Bldg., Albany, removing, replacing Guard Gate No. 4, Barge Canal. $140,000. Plans complete.

N. Y., Mindenville—Dpt. P. Wks., State Office Bldg., Albany, widening channel, Barge Canal. $220,000. Plans under way.

★†**N. Y., Montour Falls**—U. S. Eng., Chimes Bldg., Syracuse, diversion of Catherine Creek, enlargement of Shequaga Creek, constructing 2 hy. bridges and check dams; stilling basin below the falls of Shequaga Creek and replacing 1 hy. bridge. $651,000.

†**N. Y., Moravia**—U. S. Eng., Chimes Bldg., Syracuse, clearing outlet channel of Owasco Lake; channel enlargement, replacement of bridge, construction and dikes, $102,700.

★†**N. Y., Norwich**—U. S. Eng., Chimes Bldg., Syracuse, earth filled dam with control gates on Canasawacta Creek, near here. $2,114,000.

N. Y., Oneida—Dpt. P. Wks., State Office Bldg., Albany, bank protection, Barge Canal. $20,000. Design money available.

†**N. Y., Penn Yan**—U. S. Eng., Chimes Bldg., Syracuse, imprv., deepening outlet channel of Keuka Lake, replacing regulating gates and lowering of the sill together with regulated operation of lake levels, $20,000.

N. Y., Rome—Dpt. P. Wks., State Office Bldg., Albany, bank protection, vicinity Lock 21, Barge Canal, $340,000. Plans complete.

N. Y., Rome—Dpt. P. Wks., State Office Bldg., Albany, raising 2 Guard Gates, No. 6, Barge Canal, east of city, $30,000; 2 Guard Gates, No. 7, Barge Canal, $30,000; lowering Sills Guard Gate, No. 6, Barge Canal, east of city, $47,100; lowering Sills Guard Gate, No. 7, Barge Canal, $47,600. Plans under way.

★†**N. Y., Syracuse**—U. S. Eng., Chimes Bldg., earth filled detention type dam, Syracuse Reservoir 6A on west branch Onondaga Creek, approx. 7 mi. southwest of here, Onondaga Co., $904,000; rectification, enlargement Onondaga Creek Channel through reaches in southern section of city, $610,000.

N. Y., Vischers Ferry—Dpt. P. Wks., State Office Bldg., Albany, tainter gates, Barge Canal. $60,000. Plans under way.

N. Y., Warsaw—Village, stream control $20,000. State Planning Aid funds allocated.

N. Y., Waterford—Dpt. P. Wks., State Office Bldg., Albany, raising Guard Gates 1 & 2 and 2 new gates, raising, lengthening Bridge E-6. $400,000. Plans under way.

†**N. Y., Watkins Glen**—U. S. Eng., Chimes Bldg., Syracuse, enlarging Glen Creek, constructing flood walls, replacing 1 hy. bridge, enlarging 1 hy. and 1 railroad bridge. $208,000.

★†**N. Y., West Oneonta**—U. S. Eng., Chimes Bldg., Syracuse, earth filled dam with control gates, on Otego Creek, near here, Otsego Co. $2,781,000.

†**N. Y., Whitney Point**—U. S. Eng., Chimes Bldg., Syracuse, realignment river channel, constructing levee and relocating main hy. through part of village. $209,353.

†**Tenn., Memphis**—U. S. Eng., West Memphis, Ark., 12 ft. channel to Memphis waterfront. $200,000.

★**Texas**—San Antonio River Canal Assn., c/o T. C. Picnot, engr., South Texas State Bank Bldg., San Antonio, deepening, widening and other required facilities for canalizing San Antonio River between San Antonio and area Corpus Christi, Bexar, Wilson, Karnes, Goliad and Refugio Counties. $2,500,000.

†**Wash., Camas**—U. S. Eng., Pittock Bl., Portland, Ore., dredging new ship channel basin, $45,000; deepening, expanding log pond adjacent to Long-Bell Lumber Co., mouth of Cowlitz River, and dredging channel into pond, $12,000.

B. C., Kamloops—Province of British Columbia, Victoria, conservation project on Nicola River, Dpt. P. Wks., Victoria, engrs.

Ontario—Dominion Govt., Ottawa, dredging Welland River 3 mi., Montrose to Port Robinson, $100,000. Dpt. Pub. Wks., Ottawa, engrs.

Ont., Chippewa—Dominion Govt., Ottawa, Niagara River dredging from Chippewa to Lake Erie and constructing weirs, $200,000. Dpt. P. Wks., Ottawa, engrs.

Ont., Port Hope—Province of Ontario, c/o Ministry of Lands & Forests, Toronto, flood control project on Ganaraska River, $300,000.

Ont., Welland—Dpt. Transport, Ottawa, deepening Niagara River from Chippewa to Lake Erie and erecting suitable protecting weirs in Niagara River at Chippewa to safeguard shipping.

Que., Quebec City—Dominion Govt., Ottawa, Ont., harbour facilities exten. $300,000. National Harbours Bd., Ottawa, Ont., engrs.

UNCLASSIFIED

Calif., Oakland—SWIMMING POOLS, etc.—City, City Hall, 3 swimming pools, $270,000; night lighting of tennis courts, etc., $70,000.

POSTWAR PROJECTS (Cont'd.)

Ia., Lake View—AIRPORT—Catherine Monroe, city clk., City Hall, airport. Over $25,000.

Minnesota—RURAL ELECTRIFICATION SYSTEM—Traverse Electric Cooperative, Inc., L. Zimbrick, Wheaton, 430 mi. rural electric distr. sys. Over $100,000.

Minn., Elmore—SWIMMING POOL—G. F. Koepke city clk., City Hall, swimming pool. $30,000.

Minn., Pipestone—AIRPORT—City, municipal airport. Over $25,000.

★**N. J., Newark**—TRAFFIC CONTROL SIGNALS, etc.—City, City Hall, underground traffic control signals and police telegraph cables. $550,000. D. Coles, City Hall Annex, acting engr.

New York—GAS STATION—Dpt. P. Wks., Bureau Hys., Albany, gas station at Station 836, Northern State Hy., $50,000. Plans under way.

N. Y., Bear Mountain—ROLLER SKATING RINK—Conservation Dpt., State Office Bldg., Albany, roller skating rink at Bear Mt. State Park. $150,000. Design money available.

N. Y., Elmira—WALL, etc.—Dpt. Correction, State Office Bldg., Albany, new south wall, installing electrically operated gate, $160,000. Plans under way.

O., Conneaut—LAKEFRONT IMPROVEMENTS, etc.—City of Ashtabula, Ashtabula, lakefront and public dock imprvs. $300,000. W. V. Kantola, city engr.

★**O., Dayton**—RAILROAD TRACK ELEVATION—City, railroad track elevation. $4,000,000. G. F. Baker, city engr.

O., Lakewood—PLAYGROUND—City, playground construction. $150,000. E. A. Fisher, city engr.

O., Lima—AIRPORT—City, municipal airport imprvs. $50,000. J. F. Cupp, city engr.

★**O., Mansfield**—AIRPORT—City, Class 4, airport, $2,000,000. W. C. Statler, City Hall, city engr.

Tenn., Nashville—AIRFIELD—City, Mayor T. L. Cummins, City Hall, auxiliary airfield for private, non-commercial and light commercial planes, 2 or more hangars, 2 or more 5,000 ft. runways, etc. $150,000 or more.

Texas—TRANSMISSION LINE, etc.—Jasper-Newton Electric Cooperative, Inc., Jasper, transmission lines and generating plant, Jasper and Newton Counties. $185.000. REA allot.

Tex., San Antonio—SWIMMING POOLS—City, 3 outdoor rein.-con. swimming pools, Pittman-Sullivan Park, Los Angeles Heights and in west part of city. $390,000. M. Simons, Aztec Bldg., archt.

Tex., San Antonio—SWIMMING POOLS—City, G. Mauermann, mayor, City Hall, 3 rein.-con. outdoor swimming pools, 1 each in Brackenridge Park, Franklin Field and Collins Garden, $390,000. M. Simons, Aztex Bldg., archt.

Wis., Racine—DOCK—City, dock imprvs. Wm. J. Chadwick, city engr.

B. C., Prince Rupert—AIRPORT—Municipality, airport, other facilities for land-based aircraft. $300,000.

B. C., Vancouver—PARK DEVELOPMENT—Municipality, development Burnaby Mountain Burnaby Lake, Lighthouse Park at Point Atkinson and Admiralty Park opposite Barnett, $400,000. Parks' Bd., City Hall, engr.

N. B., Saint John—UNDERGROUND CONDUIT SYSTEM—Municipality, A. Wasson, mayor, removal power poles and wires and constructing underground conduit sys. for same, $300,000.

PUBLIC BUILDINGS

Conn., Bethany—City, c/o G. E. Rast, school supervr., Peck Rd. School, brick, steel regional high school. $150,000.

Conn., Bridgeport—J. McLevy, mayor, City Hall, brick, steel Nathan Hale School addn. $150,000.

★**Conn., Milford**—Dr. C. W. Maddocks, supt. Schools, West River St., brick, steel high school, $400,000-$500,000. Provoost & Everett, 321 Main St., Stamford, archts.

Conn., New London—City Supt. Schools, Dr. W. A. Hanson, Municipal Bldg., brick, steel school, southern section. $150,000.

Kan., Iola—St. Johns Hospital, Iola, hospital addn. $150,000. W. E. Glover, Westover Mart, Topeka, archt.

Me., Sanford—City Municipal Offices, City Hall, brick, steel high school. Over $150,000.

Mass., Concord—Commonwealth of Massachusetts, Dpt. Correction, State House, Boston, boiler plant general alterations, imprvs. $50,000. Charles T. Main, Inc., 201 Devonshire St., Boston, engr.

Mass., Framingham—Commonwealth of Massachusetts, State Dpt. Correction, State House, Boston, power plant extens., imprvs., Reformatory for Women. $48,500. John A. Stevens, Inc., 16 Shattuck St., Lowell, engr.

Mass., Watertown—Town, Bd. Selectmen, Town Hall, brick, steel, concrete municipal light and power plant. Over $40,000.

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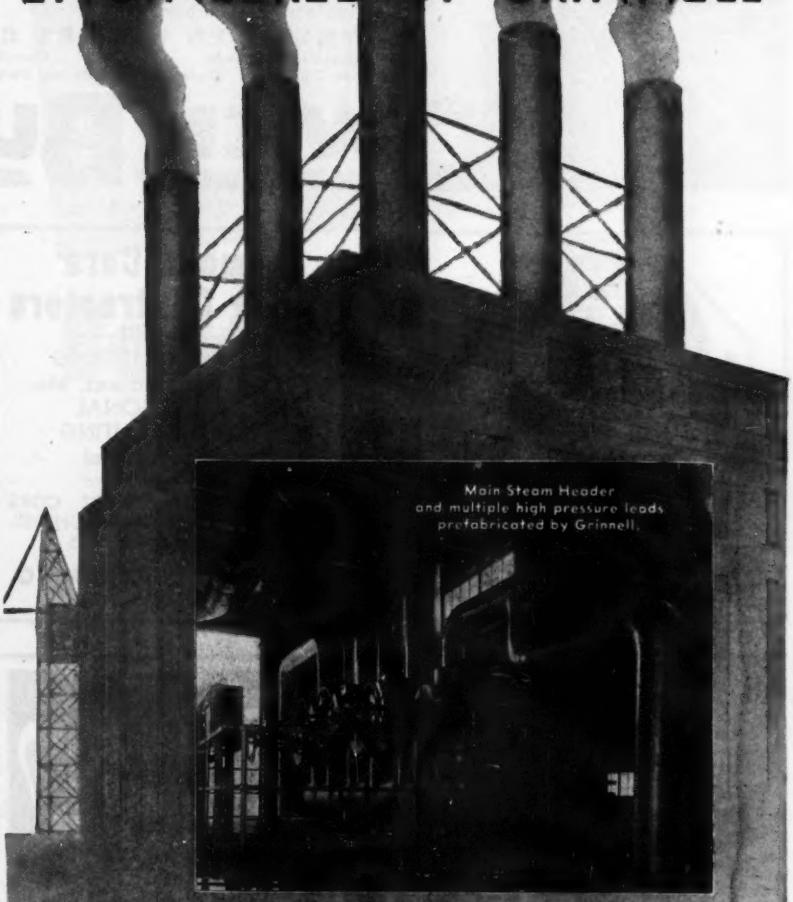

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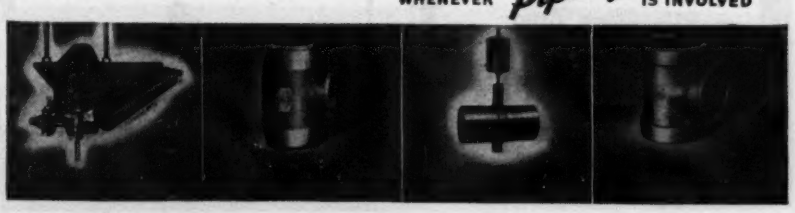

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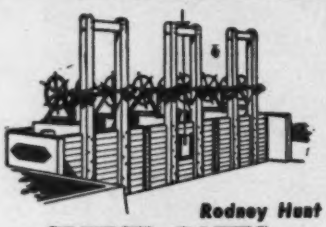

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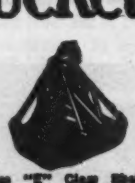

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OSTWAR PROJECTS (Cont'd.)

Mass., Worcester — Comrs. Worcester Co., unty Court House, 2 Main St., courthouse, er $150,000; central heating plant, 2 Main $65,000.

Mich., Detroit—Wayne Co., bldg. for Hall of Medical Science, $5,000,000; hospital, ,000,000. Part of medical center develop- ent. Plans under way.

Mich., Flint—City, preliminary plans by rry W. Swern & Associates, 19 S. LaSalle St., icago, Ill., rein.-con. 6 story, T-shaped men's hospital. CD 7/8—ENR 7/15.

Minn., Alexandria—H. S. Campbell, city clk., unicipal bldg. $200,000.

Minn., Blue Earth—Bd. Educ., Mrs. M. nne Russ, clk., school bldg $150,000 (not cial).

Minn., Fairmont—S. Stewart, city clk., city ll $200,000.

Minn., Montevideo—Chippewa Co., A. C. ckson, aud., court house, $150,000.

Minn., Tyler—E. T. McEvoy, village clk., ansion municipal power plant. Over $40,-

Mo., Excelsior Springs—City, E. L. Wilson, yor, city Hall, municipal auditorium seat- 1,500 persons.

N. J., Newark—City, City Hall, public library bldg. addn. $596,000. D. Coles, y Hall Annex, acting engr.

N. J., Newark—City, City Hall, city hos- pital bldg. $6,000,000; renovating conva- escent hospital and Newark Alms House, 00,000. D. Coles, City Hall Annex, acting n.

N. J., Woodbury—City, recreation bldg. and yground. $150,000.

N. Y., Auburn—Dpt. Correction, State Of- Bldg., Albany, maintenance shop bldg., at urn Prison. $250,000. Plans under way.

N. Y., Beacon—Dpt. Correction, State Office g., Albany, reconstruction, kitchen, bakery, ng room and auditorium at Matteawan e Hospital. $308,000. Plans under way.

N. Y., Brooklyn—Dpt. Mental Hygiene, State Office Bldg., Albany, skyscraper unit, 00,000; employees house at $550,000, both Brooklyn State Hospital. Design money ilable.

N. Y., Buffalo—Dpt. Mental Hygiene, State e Bldg., Albany, storehouse and shop at Buffalo State Hospital, $250,000. s under way.

N. Y., Comstock—Dpt. Correction, State e Bldg., Albany, cell hall, etc., at Great dow Prison. $250,000. Plans under way.

N. Y., Elmira—Dpt. Correction, State Office g., Albany, dining and kitchen bldg., incl. ipment, Elmira Reformatory, $450,000. s under way.

N. Y., Ithaca—Dpt. Health, State Office g., Albany, remodeling power plant, $120,- Plans under way.

N. Y., Ogdensburg—Dpt. Mental Hygiene, State Office Bldg., Albany, power house at Lawrence State Hospital. $969,700. Plans er way.

N. Y., Ossining—Dpt. Correction, State Office g., Albany, maintenance shop and storage at Sing Sing Prison, $215,000. Design ey available.

N. Y., Rochester—Dpt. Mental Hygiene, te Office Bldg., Albany, storehouse and cold age bldg., Rochester State Hospital, $226,- Plans under way.

N. Y., Syracuse—Dpt. Mental Hygiene, State e Bldg., Albany, Syracuse State School r house addn. $114,000. Plans under way.

N. Y., Thiells—Dpt. Mental Hygiene, State e Bldg., Albany, power house addn. and er plant equip. at Letchworth Village. ,000. Plans under way.

N. Y., Westfield—Dpt. Correction, State e Bldg., Albany, inmate dormitory at ford Hills State Farm & State Prison, ,000, design money available; replace- t boilers and boiler plant equipment at ford Hills State Farm and Prison, $158,- plans under way.

Ohio, Barberton—City, new municipal bldg. ,000. H. Bushey, City Hall, city engr.

Ohio, Kent—Kent State University, plans by e Architects, State Office Bldg., Columbus, ent health bldg., on campus. $153,000.

Ohio, Lakewood—City, imprv. municipal elect- plant. $125,000. E. A. Fisher, city engr.

Ohio, Lorain—City, municipal bldg. $500,000. H. F. Alexander, City Hall, city engr.

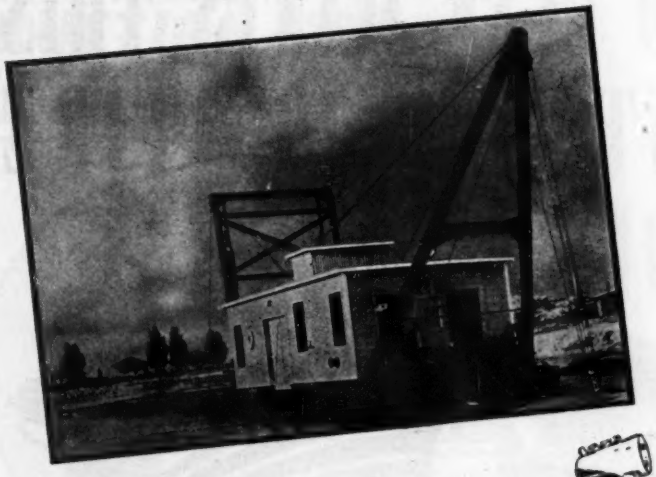
Ohio, Salem—Salem City Hospital Assn., 25 hospital addn. $150,000.

Okla., Electra—City, auditorium and city $294,000.

Wash., Seattle—City, Mayor W. H. Devin, County-City Bldg., Zone 4, central police ion, $1,250,000; police substations, $450,- fire department stations, $438,250; health er, $400,000; rebuilding central library, 5,000; branch libraries, $400,000.

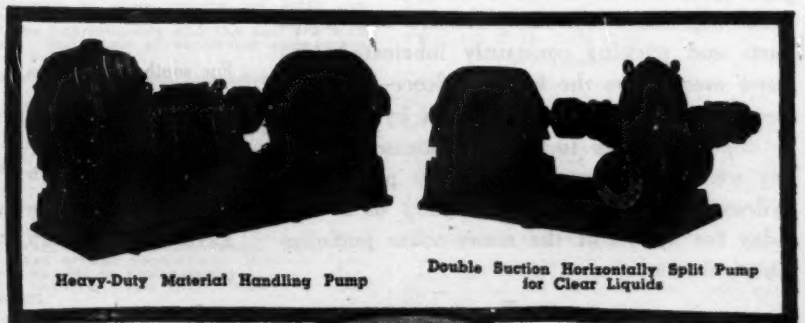
B. C., Kamloops—Provincial Govt., Victoria, storage plant. $40,000. Dpt. P. Wks., oria, archts.

B. C., New Westminster—Bd. Educ., plans Evans & Son, 119 W. Pender St., Van- er, school bldg. $150,000 or more.



Bottoms Up...

If you could see the bottom of your water supply reservoir, you would very likely be astonished at the depth of sediment and debris which has accumulated over a period of years. In many localities water storage reservoirs are gradually filling up with deposits, but this need not mean eventual abandonment of the reservoir and the high cost of building a new one to replace it. The most economical remedy for this condition is a Morris Hydraulic Dredge, which has been used for this work by municipalities and power companies all over the country—in some cases at a cost of less than 10 cents per cu. yd. of excavated material. Complete information will be sent on request.



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Firemen in hundreds of cities are smiling with satisfaction these days because farsighted officials specified MUELLER-COLUMBIANS when fire hydrants were ordered. With freezing weather upon them, here is a hydrant that successfully battles zero temperatures . . . The positive acting, bronze-bushed double drain valves drain the barrel absolutely dry EVERY time the hydrant is used. It cannot freeze. The compression-type main valve has more taper than usual and a tough leather facing gives tight water shut-off. It cannot freeze. The lower half of the barrel has a definite flare outward toward the bottom. This prevents frost heave and eliminates troublesome "frost jackets". Even the bonnet with its weatherproof cap has a self-oiling feature that keeps parts and packing constantly lubricated. No water ever enters the bonnet. Since it cannot freeze a MUELLER-COLUMBIAN hydrant can be depended upon to function immediately in any weather. No wonder firemen prefer this hydrant. You will, too! . . . Drop us a card today for details of the many other performance features.

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POSTWAR PROJECTS (Cont'd.)

★**Man., Winnipeg**—Bd. Educ., c/o H. Chappell, chn., Post War Com., City Hall, technical-vocational school, $1,000,000.

★**N. B., Saint John**—Municipality, A. Wasson, mayor, civic centre. $500,000.

N. B., Sackville—Municipality, town hall, $150,000.

N. S., Dartmouth—Municipality, reconstructing bldgs. on Portland St., leveling eastern side of Commercial St. and constructing park at entrance to town. $300,000.

Ont., Brockville—Bd. Educ., school. $400,000.

Ont., Cobourg—Durham Co., E. L. MacNachtan, clk., Cobourg, county home addn., new county office bldg., court house, $350,000.

Ont., Gananoque—Town, C. E. Shaw, clk., high school. $250,000.

Ont., Whitby—Town, J. R. Frost, clk., office and storeroom. $50,000.

★**Que., Quebec City**—Provincial Govt., c/o Dpt. Lands & Forest, forestry school. $500,000. Dpt. Pub. Wks., Quebec City, engrs.

COMMERCIAL BUILDINGS

Mass., Boston—Boston University, 688 Boylston St., plans by Cram & Ferguson, 246 Boylston St., and Coolidge, Shepley, Bulfinch & Abbott, 1 Court St., brick, steel scientific bldg., between Common Ave. and Bay State Rd. Over $150,000.

Mass., Brighton—Temple Bnai Moshe, J. B. Lerner, pres., 96 Chestnut Hill Ave., temple, $150,000.

Mich., Detroit—Detroit Historical Society, 2302 Barlum Tower, Zone 26, plans by Wm. E. Kapp, 730 Buhl Bldg., Zone 26, 2 story, brick stone, steel and concrete museum bldg. and memorial hall, $250,000.

O., Cleveland—Central National Bank of Cleveland, B. Crowell, pres., 308 Euclid Ave., banking quarters, new bldg. or alterations.

★**Minn., St. Paul**—Farmers' Union Grain Terminal Assn., M. W. Thatcher, genl. mgr., 1923 University Ave., central office bldg. involving offices and plant. $500,000.

★**Tex., Abilene**—Hardin-Simmons University (Baptist Foundation of Texas, owner, 1706 Pacific St., Dallas), bldg. imprvs. $500,000. Raising endowment.

Tex., Belton—Mary Hardin-Baylor College (Baptist Foundation of Texas, owner, 1706 Pacific St., Dallas), bldg. imprvs. $150,000. Raising endowment.

Tex., Brownsville—A. and L. Parker, owners' agents, San Benito, Del Mar Beach site development, 800 acres incl. resort imprvs., swimming pools, amusement facilities, cottages, grounds imprvs., etc. Over $150,000.

★**Tex., Fort Worth** — Southwestern Baptist Theological Seminary, bldg. exten., imprvs. $700,000. Endowment being raised.

Tex., Houston—C. B. Archer, Bunker Hill Rd., purchased 224-acre tract for construction development, incl. sanitary sewers, water lines, gas lines, electric facilities, asphalt street paving, etc.

Tex., Sherman—Austin College, Sherman, college. $200,000.

★**Tex., Waco** — Baylor University, Waco, bldg. exten., imprvs. $500,000. Endowment being raised.

★**Ont., Toronto**—Canadian National Exhibition, Lumsden Bldg., E. A. Hughes, genl. mgr., reconstructing bldgs. $1,000,000.

INDUSTRIAL BUILDINGS

Conn., Bridgeport — WAREHOUSE — Connecticut Distributors, Inc., 540 Water St., plans by L. Asheim, 211 State St., 1 and 2 story, 43x200 ft. and 60x120 ft., concrete, steel, glass block warehouse, Water and Wall Sts., and truck storage area for ten 3 ton trucks, central heating sys., etc. Over $40,000.

Ill., Dixon — PLANT — Rockford Coca-Cola Bottling Co., G. B. Griggs, pres., bottling plant. Over $40,000 with equip.

Mo., St. Louis—FACTORY—St. Louis Macaroni Mfg. Co., Inc., 5125 Bischof Ave., constr. completing factory on 250x242 ft. addn. $250,000.

Tex., Beaumont—PLANT—Southern Acid & Sulphur Co., Inc., 65 Beaumont, and 7831 Wallisville Rd., Houston, acid and sulphur plant unit. $450,000.

Tex., Houston—PLANT—Coca-Cola Bottling Co., Live Oak St., plant expansion. Over $40,000.

Tex., Houston—STORAGE—Higbee & Mitchell Co., 1418 Dallas St., auto parts and storage bldg., 1415 Dallas St. $40,000.

Ont., Preston — FACTORY — Grah Cooker, Ltd., large factory bldgs. About $45,000.

Ont., Toronto—PLANT—Owner, c/o G. A. Adamson, archt., 96 Bloor St. W., mfg. plant. $300,000.

CONSTRUCTION REPORTS

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ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*

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WATER SUPPLY

PROPOSED WORK

†Fla., Lynn Haven—Federal Works Agency, ...ndler Bldg., Atlanta, Ga., imprvs., munici... water works incl. new deep well, aerator, ...ctric driven service pump, chlorinator and ...cessary appurtenances, Fla. 8-289, $23,000.

Fla., Pensacola—City, water works sys. ...ldns. and extensions. Yonge & Hart, Thie... Bldg., archts. and E. J. Ladd Engr. ..., 209 Bona Allen Bldg., Atlanta, 3, Ga., ...grs.

†Mich., Clawson—Village, WW imprvs., ... in. well pump. equip. and 8 in. connecting ...ins. electrically operated pumps, appurte... ...ces. $45,375. FWA.

...lich., Menominee—City, Water Dpt., J. S. ...illiams, secy., repairs and extens. to filter ...ls in city filtration plant. Approx. $55,000. ...h. Boyd & Porath, Columbus Bldg., Green ..., Wis., engrs.

...ont., Great Falls—W. P. Harrison, city ... City Hall, addnl. water storage mains, ...,000. Corwin & Co., 225 Ford Bldg., ...rs. CD 10/27—ENR 11/4.

... C., Jacksonville—Town, C. Warn, mayor ... Bd. Alderman, bids soon, water and ...er exten. W. F. Freeman, High Point, ...

...kla., Midwest City — R. Brust, mayor, ... Hall, voted bonds for purchase existing ... pump. sta. and tank and construction ... addnl. wells, watermains and storage ...rvoir. Est. $250,000. W. B. McMasters, ... Military St., Oklahoma City, engr. CD ...1—ENR 12/23.

†Tex., Dallas—City, 1944 WW imprvs., ...luding installing several 8 and 20 or 36 in. ... etc. $4,869,000. FWA. J. M. Nagle, ... Hall, engr. CD 7/29—ENR 8/5.

Tex., Houston—Harris Co. Water Dist. 5, ...water and sewerage sys. addns. $758,400. ...plied for FWA funds. J. C. Calhoun, Jr., ...ston Merchants Exchange Bldg., engr.

Tex., Houston—Harris Co. Water Dist. #5, ...water and sewer imprvs., Tex. 41-664F. J. ...Calhoun, 812 Houston Merchants Exchange ...k Bldg., engr., $758,400. Applied for FWA ...ds.

...ash., Seattle—City Bd. Pub. Wks., Coun... City Bldg., Zone 4, rebuilding 24 and 36 ...steel drain line from Beacon Hill reser... to 9 Ave. and Airport Way, $66,000 and ...er main in Airport Way and Holgate ... $256,000. C. L. Wartelle, County-City ... city engr.

...is., Lake (P. O. Milwaukee)—Town, E. P. ...n, clk., 4001 S. 6 St., Milwaukee, Zone 7, ...0 gal. reservior, new well, pump house, ...ter pump and laying 1,800 ft. 12 in. c.i. ...rmain. E. J. Voelker, 4001 S. 6 St., ...aukee, Zone 7, engr.

...ue., Quebec City—L. Boone, mayor, City ...Hall, bids soon, filtration plant, $1,000,000. ...Hamel, c/o owner, engr.

...D ASKED

Bids Asked January 20

...ss., Petal—Federal Works Agency, ...ller Bldg., Atlanta, Ga., WW sys. and ...r. R. T. Myers, Hattiesburg, engr.

Bids Asked About January 21

..., Panama City—City, c/o G. E. Swank, ... mgr., addnl. water works incl. 17,600 ...ft. 6- to 12-in. c.i. waterlines, 1 gravel ... well with turbine pump house and con... Smith & Gillespie, Realty Bldg., Jack... ...ille, engrs.

Bids Asked January 25

...Y., Greece—Water Dpt., 1100 Latta Rd., ... supply sys. exten. $35,000. H. A. Her... 2550 Ridge Rd., engr.

Bids Asked January 27

...x., Killeen—B. C. McGregor, city secty., ... Hall, waterworks imprvs., Tex. 41-548. ... deposit $50, extended date. F. J. Von ..., 607 Mistletoe Blvd., Fort Worth, engr. ...00. FWA. CD 12/23—ENR 12/30.

... BIDDERS

...ich., Detroit—Dpt. Water Supply, 735 ...olph St., Dec. 29, watermains, appur... ...ces. Mich. 20-907, from G. Vella Co., ...E. 8 Mile Rd., $38,950. FWA.

...x., Fort Worth—S. H. Bothwell, city ... City Hall, Jan. 4, reservoir, Contr. 3, ...41-611, from J. B. Ciardy Constr. Co., ... Goldenrod St., $90,156. FWA. CD 12/16 ...R 12/23.

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply	Unclassified
Sewers, Waste Disposal	Latin America
Bridges	Public Buildings
Streets & Roads	Commercial Buildings
Earthwork, Waterways	Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

†Va., Williamsburg—Federal Works Agency, 601 State Planters Bank Bldg., Richmond, Zone 19, Jan. 6, water distr. sys., (A) 16 in. mains (B) 20 in. mains, Va. 44907, from A. Stanley Mundey, 52 Main St., Woodbridge, N. J., (A) $214,714 (B) $220,764. CD 12/29—ENR 11/25.

CONTRACTS AWARDED

†Ala., Mobile—U. S. Eng., Grant St. west of Westwood St., Mobile, addnl. water supply and sewage disposal sys., Brookley Field, Ser. No. 266 to Foster Creighton Co., American National Bank Bldg., Nashville, Tenn., $60,952.

†O., Sharonville—U. S. Eng., 522 U. S. Post Office and Courthouse, Cincinnati, watermain, Contr. 33-015-Eng-181, Sharonville Engineer Depot, to G. H. Leach Co., Inc., Degraff, $16,577.

S. D., Sioux Falls—City, well constr. and auxiliary work to Kramme-Jensen Co., 1901 Easton Blvd., Des Moines, Ia., $22,733. CD 12/6—ENR 12/9.

Tex., Houston—City, c.i. water mains on Axin, Kress and Hoffman Sts., to W. A. McClendon, 4617 Walker Ave., approx. $15,000. Bids 12/21.

†Tex., Kingsville—Mayor, City Hall, WW imprvs., Tex. 41-515, to R. H. Folmar, Austin, $16,200. FWA. CD 12/8—ENR 12/16.

Utah, Springville—City, extens., enlargements water distr. sys., to Enoch Smith Sons Co., 567 I St., Salt Lake City, $20,700. Bids 12/23. E. D. Kennelly, engr.

Wis., Manitowoc—Bd. P. Wks., City Hall, water supply to Ranney Water Collector Corp., 2 W. 45 St., New York, N. Y. CD 12/14—ENR 12/16.

Wis., Waukesha—Borden Co., 1171 Riverside Dr., drilling 1,900 ft. deep well, to Layne-Northwest Co., 709 N. 11 St., Milwaukee, Zone 3, $26,850. CD 6/23—ENR 7/1.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Neb., Sidney—R. E. Roche, mayor, sewage disposal plant enlargement. $65,000. R. E. Fulton, 2327 S. 19 St., Lincoln, engr. FWA rejected application for funds. CD 9/28—ENR 9/30.

Okla., McAlester—H. D. Smith, mayor, sewage disposal plant. $35,000. Will apply to FWA for funds. (Correction—status.) R. Collins Eng. Co., McAlester, engrs. CD 1/4—ENR 1/6.

S. C., Summerville—City, c/o H. Hamilton, clk., City Hall, sanitary sewer collection sys. and sewage disposal plant. $165,000. Tomlinson Eng. Co., Columbus, engrs.

Tex., Freeport—City, F W Arrington, mayor, drainage sys., Tex. 41-665. $49,500. Applied for FWA funds. C. P. Smith, Orange, engr.

Tex., Pear Ridge—S. S. Lynch, mayor, Town Hall, sewer facilities, Tex. 41-662, $69,339. Applied for FWA funds. Howe & Wise, 607 Stewart Bldg., Houston, engrs.

†Va., Quantico—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., sewage disposal plant, Va. 44122. Wiley & Wilson, Peoples Bank Bldg., Lynchburg, archts.

★**Wash., Seattle**—City, County-City Bldg., Zone 4, trunk sewer for White Center Dist., $1,175,000. C. L. Wartelle, County-City Bldg., engr.

Que., Quebec City—Municipality, F. X. Chouinard, City Clk., trunk sewer. $200,000. E. Hamel, City Hall, engr.

BIDS ASKED

Bids Asked January 23

Ont., Kingston—Municipality, c/o F. J. Parker, clk., 30 in. concrete sewers, Charles, Rideau Sts., thence to Cataraqui River.

Bids Asked January 26

†Tex., Harlingen—H. Ramsey, mayor, City Hall, sewer imprvs., Tex. 41-648. Plans deposit $10. A. Tamm, engr. $25,000. FWA. CD 11/17—ENR 11/25.

Bids Asked January 27

†Tex., Killeen—B. C. McGregor, city secty., City Hall, sewage imprvs., Tex. 41-548. Plans deposit $50. Extended date. F. J. Von Zuben, 604 Mistletoe Blvd., Fort Worth, engr. $90,525. FWA. CD 12/23—ENR 12/30.

Bids Asked February 1

Ont., Centerville—Water Township, drainage project. H. Johnston, Kitchner, engr.

LOW BIDDERS

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., Hall of Records, Jan. 4, vitr. clay pipe sanitary sewer, Long Beach Blvd., C.I. No. 106, from Artukovich Bros., 7320 N. Atlantic Blvd., Hynes, $85,337. A. Jones, Hall of Records, engr. CD 12/16—ENR 12/23.

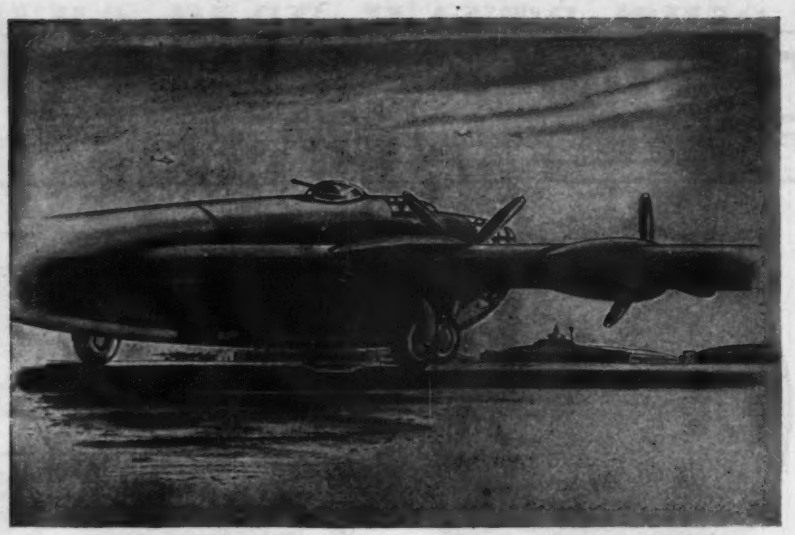
CONTRACTS AWARDED

†Calif., Richmond—H. J. Kaiser Co., sewer, water and miscellaneous pipe lines, Shipyard No. 2, to Lohman Bros., 1296 San Pablo Ave., Berkeley. Federally financed.

†Conn., Bridgeport—City, F. Schwarzkopf, hy. comr., Contr. 9, Sect. 1, trunk and storm sewers, Water St., Conn. 6-107, to V. Barletta Co., 19 Whipple Ave., Roslindale, Mass., $213,375. CD 12/31—ENR 1/6, under LB.

†Fla., Daytona Beach—City, 2 pumping stations with submerged type electric driven sewage pumps, Ser. No. 8-276, to Boyd & Goforth, 1236 W. Forsythe St., Jacksonville, $37,175. FWA. CD 9/28—ENR 9/30.

†Kan., Pratt—U. S. Eng., 10 E. 17 St., Kansas City, Mo., sewage disposal plant, to Grundeman Const. Co., Holton, $31,318.



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SEWERS & WASTE (Contracts Awarded Cont'd.)

†Kan., Victoria—U. S. Eng., 10 E. 17 St., Kansas City, Mo., sewage disposal plant, to Burt & Binford, Hutchinson, $33,500.

Mich., Dearborn—City, brick, steel and concrete bldg., housing 80 ton capacity incinerator, to R. E. Dailey & Co., 4500 Oakman St., Detroit, Zone 4, $26,000. CD 10/5—ENR 10/7.

†S. C., Charleston—U. S. Eng., 32 Custom house, sewage disposal sys., Contr. 38-013-Eng-97, to C. Y. Thomason Co., Greenwood, $33,489.

Tex., Houston—City, incinerator imprvs., to Consolidated Constr. Co., Second National Bank Bldg., approx. $25,000.

Tex., San Marcos—City, laying sanitary sewer mains, to Truehart & Caldwell, 6th Builders Exchange Bldg., San Antonio, approx. $33,000. Wm. N. Jones, City Hall, city engr.

N. B., Scoudouc (Moncton)—Dpt. National Defense for Air, Ottawa, Ont., sewage treatment plant at Repair Depot, to Canadian Comstock Co. Ltd., Nelson Bldg., Halifax, N. S., $32,000. Bids 12/1. CD 11/22—ENR 11/25.

BRIDGES

PROPOSED WORK

Conn., Bridgeport—City, P. Brewster, Dir. Pub. Wks., repairing bridge span, Grand St., $31,000.

Utah, Salt Lake City—City, c/o J. B. Matheson, comr. Streets, City Hall, viaduct on North St. between 4 and 5 West Sts. $350,000. W. D. Beers, City and County Bldg., city engr.

Que., Quebec City—Municipality, P. N. Chouinard, city clk., bridge at end of Remparts Ave. $100,000. E. Hamel, City Hall, engr.

LOW BIDDERS

†R. I., Newport—City, City Hall, Dec. 16, reconstruct westerly approach, Van Ness Ave., R.I. 3716J, from Coleman Brothers Corp., 245 State St., Boston, Mass., $13,2[illegible]. Chas. A. Maguire & Associates, 1515 Turks Head Bldg., Providence, engrs. CD 12/[illegible] ENR 12/23.

CONTRACTS AWARDED

Virginia—Dpt. Hys., Richmond, bridge over Penn. R. R., Route 60, Proj. DA-NR 463-P.R.A. No. DA-NR 50-A (1), Princess Anne Co., to Bowers Constr. Co., Box 1766, Raleigh, N. C., $69,854.

STREETS AND ROADS

BIDS ASKED

Bids Asked January 27

California—State Div. Hys., State Bldg., Los Angeles, grading, plant mix surfacing 6.1 mi. Ontario St. between Empire and Thornton Aves., Burbank, and Woodley Ave., North and Roscoe Blvd., between Parthenia and Woodley Ave. South, in City of Los Angeles, both in Los Angeles Co., for State Div. Hys., P. W. Bldg., Sacramento. G. T. McCoy, Sacramento state hy. engr.

Bids Asked

†Mass., South Boston (sta. Boston)—U. S. Eng., 31 St. James Ave., Boston (selected bidders), grading, paving, fencing, No. 023-44-Neg-155. $20,000.

LOW BIDDERS

Calif., Vallejo—City, City Hall, Jan. 3, imprv. Vista Imprvt. Dist., from E. E. Lowe, 1248 Georgia St., $100,072. T. D. Kilkenny, city engr.

†Maryland—Public Roads Admin., Federal Works Agency, Arlington Co. at office H. C. Speiman, dist. engr., 1440 Columbia Pike, Arlington, Va., Jan. 4, constructing Project No. DA NR 4-F(2), access road to Naval Powder factory, Indian Head, Prince Georges Co., from C. J. Langenfelder & Son, 5427 No. Philla. Rd., Rosedale. $209,391. CD 12/22.

Md., Baltimore—City Bd. Awards, City Hall, Dec. 21, concrete paving, Contr. 746, to Beaver Constr. Co. Race & Jeffrey Sts., Baltimore, $36,844. CD 12/27.

Mich., Allen Park (br. Dearborn)—State Hy. Dpt., Lansing, Dec. 22, concrete paving [illegible] mi. Van Born Rd., from Taylor Bros. (Canada) Inc., Birmingham, $115,776 for State Hy. Dpt., Lansing and Wayne County Road Comm., Detroit.

Texas—State Hy. Dpt., Austin, flexible base and single asphalt surface treatment [illegible] mi. U.S. Hy. 377, Contr. 1 81-3 & 4 and 6 & 7, Denton Co. from R. W. McKinzey, Decatur, cogdoches. $52,678.

CONTRACTS AWARDED

†Ala., Fort McClellan—U. S. Eng., Granby & West of Westwood St., Mobile, road, Contr. 01-076-Eng-147 to Ledbetter-Johnson, contractors, Rome, Ga., $57,317.

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STREETS and ROADS (Contracts Awarded, Cont'd.)

†Md., Camp Springs—U. S. Eng., First and Douglas Sts. N.W., Wash., D. C., surfacing existing roads, Contr. 49-080-Eng-54 to Corson and Gruman Co., 33 and K Sts. N.W., Wash., D. C. **$58,400.**

†O., Wright Field (br. Dayton)—U. S. Eng., Wright Field, paving and drainage, Contr. 33-046-Eng-73 to Foley Constr. Co., Boudinot and C & O R.R. Chvt., Cincinnati. **$28,832.**

†Tex., Greenville—U. S. Eng., 231 W. Main St., Denison, addnl. streets, parking area to Vilbig Constr. Co., 817 Bourbon St., Dallas, approx. **$35,000.**

†Tex., Kelly Field (br. San Antonio)—U. S. Eng., Fort Sam Houston, grading, asphalt paving of parking area for Cylinder Reclamation zone to Colglazier & Hoff, 326 Sequin Rd., San Antonio, approx. **$25,000.** Bids 12/31.

†Tex., Texarkana—U. S. Eng., 231 W. Main St., Denison, 24,000 sq. yd., 7 in. concrete paving to Campbell & Kay, Tyler, **$80,000.**

Utah—State Rd. Comn., State Capitol, Salt Lake City, plant mix bituminous road surfacing 5.497 mi. road between Wendover and Knolls, Tooele Co., to Hunts & Frandsen Constr. Co., Elko, Nev., **$85,774.** J. S. Evans, ch. engr. Bids 12/29.

Virginia—State Hy. Dpt., Richmond, concrete paving and bridge 0.712 mi., Route 601, Proj. DA-WR 1356-LBI, P.R.A. No. DA-WR 31-A(1), Norfolk and Princess Anne Counties to Y. L. Brown, 4619 W. Broad St., Richmond, Zone 21, **$66,212,** and asphaltic concrete paving 0.984 mi., Bainbridge Blvd. Proj. DA-NR 1284-M9, 10, P.R.A. No. DA-NR 57-A(1) Norfolk Co., to Norfolk Paving Co., Box 4001, Broad Creek Village Sta., Norfolk, Zone 2, **$31,210.**

†Wash., Fort Lewis—U. S. Eng., 800 2 Ave., Seattle, Zone 4, pavements, sidewalks, parking areas, station hospital, Sect. 5, Contr. 45-108-Eng-460, to J. D. Shotwell, Tacoma, approx. **$49,722.**

EARTHWORK, WATERWAYS

PROPOSED WORK

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, levee work on Verdigris River, Wagoner Co., in Catoosa area. Over $15,000.

Tex., Freeport—F. W. Arrington, mayor, City Hall, drainage sys., Tex. 41-665N, C. P. Smith, Orange, engr. $49,500, applying for FWA funds.

Tex., Houston—Sheffield Steel Co. of Texas, Industrial Rd., bids soon, dredging out channel from Houston Ship Channel to loading docks at plant. R. J. Cummins, Bankers Mtge. Bldg., engr.

BIDS ASKED

Bids Asked January 24

†Washington—Bureau of Reclamation, Yakima, constr. earthwork, pipe lines and structures, extensions of laterals 38.1 to 45.4 and sublaterals and diversion channels, mile 12.60 to mile 26.58, from 15 mi. northwest to 8 mi. northwest of Sunnyside, on Rosa Division, Yakima Proj., Spec. 1718-D. W. R. Young, acting ch. engr.

Bids Asked January 31

†Arizona—Bureau of Reclamation, Federal Bldg., Yuma, earthwork, concrete lining and structures, station 4562 plus 67 to station 5726 plus 83, Coachella Canal, All-American canal system, Boulder Canyon project, Arizona-California-Nevada, 90 to 106 mi., northwest of Yuma, Spec. 1065. (Correction—bid date); adv. ENR 1/13. CD 1/4—ENR 1/6.

LOW BIDDERS

Conn., Hartford—City Bd. Contract & Supply, 550 Main St., Jan. 4, Contr. 24, flood protection, underground regulator chamber, incl. sluice gate, regulator gate and shear gate, sewer connections, Church and Spruce Sts., from B M Y Constr. Co., 752 Silas Deane Hy., Wethersfield, **$18,821.** CD 12/31 under Sew.

CONTRACTS AWARDED

†Calif., Burbank—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, flood protection and fencing, Lockheed Air Terminal, No. 110, to Rhoades Bros. & Shofner, 3369 Madford St., Los Angeles, **$61,242.**

†Calif., San Bernardino—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, channel constr., San Bernardino Air Depot, Contr. 04-353-Eng-311, to Eggiestone & Root, San Bernardino, **$16,510.**

†Kan., Walker—U. S. Eng., 10 E, 17 St., Kansas City, Mo., excav., embankment, paving, etc., Contr. 33-028-Eng-289, to McMichael Concrete Co., 701 W. 21 St., Tulsa, Okla., **$95,382.**

†Tex., Randolph Field—U. S. Eng., Fort Sam Houston, addnl. drainage work, to Briggs & Killian, Sunset Rd., San Antonio, approx. **$25,000.**

†Washington—U. S. Eng., Pittock Block, Portland, Oreg., outlet canal to Leonard & Slate, 7805 S.W. 40 Ave., Portland, Ore., **$57,520.**

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6	2.5	3.00	2.25	11.71
8	2.5	4.00	2.25	14.63
10	2.5	5.00	2.25	17.70
12	2.5	6.00	2.25	20.86
14	2.5	7.00	2.25	24.02
16	2.5	8.25	2.25	33.07
18	2.5	9.25	2.25	36.88
20	2.5	10.50	2.25	40.71
24	2.5	13.00	2.50	53.02
30	2.75	16.00	2.50	65.36
36	2.75	19.00	2.50	77.96
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54	4.0	38.00	3.00	135.60
60	4.0	42.00	3.00	150.70

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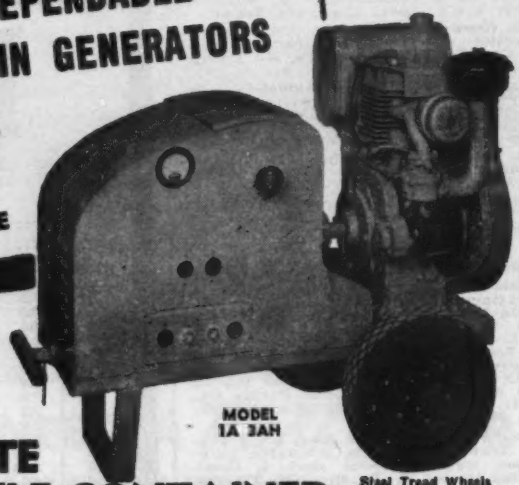

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EARTHWORK, WATERWAYS (Contracts Awarded, Cont'd.)

Ont., Ericau—Harwich Twp. Council, Blenheim, raising level of present sea wall, building 3 new jetties, driving addition piles, installing new pump and pump. basin to keep Lake Erie water from inundating gardens lands, Harwich Twp., near here, to Detroit River Constr., Co., London St., Windsor. Est. $40,000, pump. sys. to Smith & Smith, Chatham. G. A. McCubbin, Chatham, engr. CD 12/13—ENR 12/23, under CA.

UNCLASSIFIED

PROPOSED WORK

Calif., Richmond — CRANEWAY EXTENSION, etc.—H. J. Kaiser Co., Richmond, awards contract, craneway extens. and relocation craneway column at Prefabrication Bldg., Yard 2.

Ia., Monticello—SWIMMING POOL—R. C. Hoag, mayor, swimming pool. $25,000. Howard R. Green Co., 417 1 Ave. S.E., Cedar Rapids, engr.

Ia., Mount Pleasant—AIRPORT—City, J. P. Budde, clk., voted $50,000 bond for airport site purchase, total cost $200,000. CD 12/4—ENR 12/16.

La., Benton—OIL WELL, etc.—J. R. Hayden, et al, Benton, drilling, developing 6,000 ft. test oil well, storage facilities, fuel line, No. 1 Ellerbe, 5 mi. northeast of here. Est. over $25,000.

Minnesota—RURAL ELECTRIFICATION—Wright Hennepin Cooperative Electric Assoc., Maple Lake, rural electrification sys., $28,000. REA.

Minn., Brainerd—AIRPORT—City, W. Fall, clk., and Crow Wing Co., F. M. Hagberg, auditor, airport on Hy. 210 between Brainerd and Ironton, over $75,000.

Nebraska — RURAL ELECTRIFICATION SYSTEM—Burt Co. Rural Public Power Dist., Tekamah, rural electrification sys., $60,000.

N. J., Wildwood—AMUSEMENT PIER, etc.—Hunt's Theatres & Amusements, 3566 Atlantic Ave., 600 ft. long. amusement pier and dance pavilion, theatre, stores, etc. $350,000. Thalheimer & Weitz, 1315 Walnut St., Phila., Pa., archts.

†**N. D., Williston**—AIRPORT—City, W. E. Robinson, city aud. municipal airport. $50,000. CAA.

†**Okla., Enid**—APRON, etc.—U. S. Eng., 420 Wright Bldg., Tulsa, Zone 2, addnl. apron and taxiways, Sol. No. 34-066-44-54. Over $25,000.

†**Pa., Phila.**—RAILROAD TRACK WORK—U. S. Eng., Penn Mutual Bldg., 6 and Walnut Sts., railroad track work.

Texas—OIL PIPELINE—Gulf Oil Co., 2 and Sana Fe Sts., Dallas, 10 in. 48 mi. crude oil pipeline carrier from Big Sandy to Longview, $90,000.

Texas—OIL WELLS—Geo. H. Echols, Commerce Bldg., Houston, several deep test oil wells on 22,500 acres, Rio Grande City and San Manuel areas, over $25,000.

Texas—RURAL ELECTRIFICATION—Mid-South Electric Cooperative Assoc., Navasota, rural electrification sys., $190,000 REA.

Tex., Abilene—OIL WELL—O. P. Leonard & Associates, drilling, deep test oil well, $25,000.

Tex., Apple Springs—OIL WELL—American Liberty Oil Co., First National Bank Bldg., Dallas, drilling, casing, developing new 5,000 ft. test oil well, No. 1, S. H. McClain. Over $25,000.

Tex., Beaumont—OIL WELL—Sun Oil Co., Esperson Bldg., Houston, developing another 8,000 ft. test oil well, D. Burrell survey. Over $25,000.

Tex., Benevides—OIL WELL, etc.—M. E. Davis, et al, 1300 S. Henderson, Dallas, developing 6,000 ft. test oil well, storage facilities, 5 mi. northeast of here, Duval Co.

Tex., Bowie—OIL WELL—Continental Oil Co., Eagle Ford Bldg., Dallas, developing 7,350 ft. test oil well, over $25,000.

Tex., Bowie—OIL WELL—Whitaker Oil Co., D. Waggener Bldg., Fort Worth, drilling, developing new 7,200 ft. test oil well, over $25,000.

Tex., Carthage—OIL WELL, etc.—Rogers Lacy, Longview, developing deep test oil well, storage facilities, etc., over $25,000.

Tex., Chandler—OIL WELL—Delta Drilling Co., Tyler, developing 10,000 ft. test oil well, storage facilities, 5 mi. south of here, No. 1 Texas Pecan Nursery. Over $25,000.

Tex., Corpus Christi—OIL WELL—E. Galloway, developing 6,000 ft. test oil well, No. 1, Morgan, Bentonville-King field, over $25,000.

Tex., Corpus Christi—OIL WELL—Southern Minerals Corp., developing 7,000 ft. test oil well No. 30, King, Bentonville-King No. 32, over $25,000.

Tex., Crystal City — OIL WELL, etc.—Texas Co., 723 San Jacinto, developing 4,500 ft. test oil well, storage facilities, No. 1, Stuart, B. F. Burke survey #19, 12 mi. northwest of here, over $25,000.

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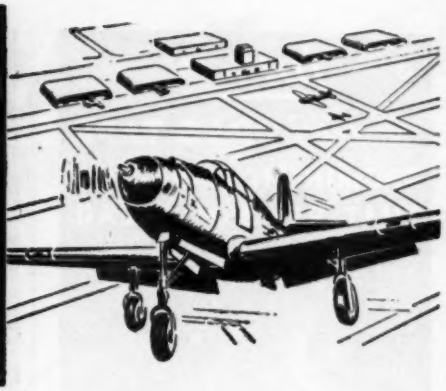

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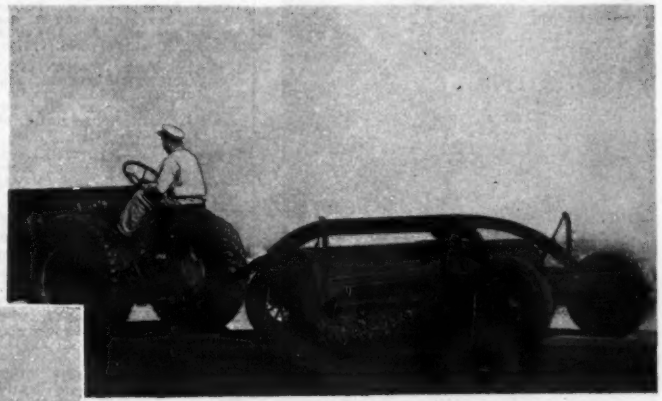
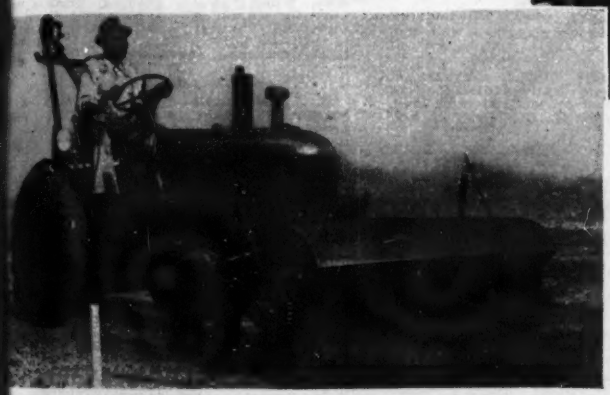
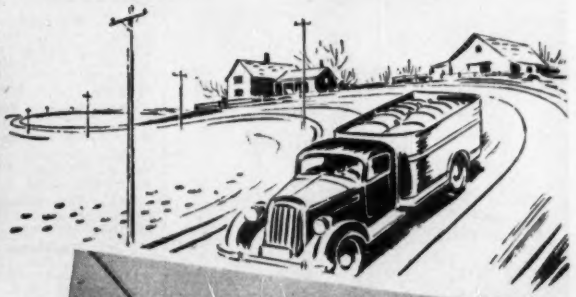
Axle driven, motor driven, or front end tractor sweepers for construction and maintenance of asphalt and other pavements. Also use them for—sweeping light snow from sidewalks and roads.

MAINTAINING ASPHALTIC SURFACE TREATMENT IN SUMMER. Keep plenty of gravel swept on to surfaces that tend to become sticky under summer sun. "A stitch in time saves ninety" here.







★ ★ ★

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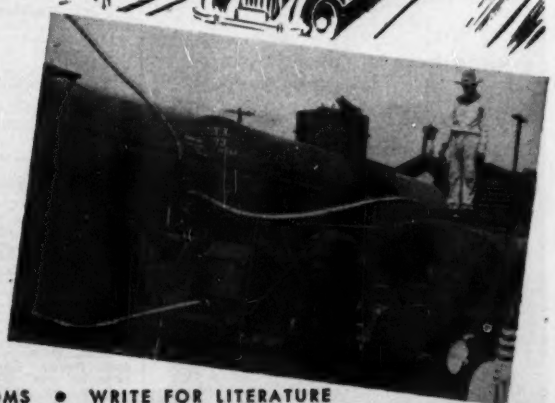

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UNCLASSIFIED (Proposed Work, Cont'd.)

Tex., Daingerfield—OIL WELL—S. A. Cochran, developing deep test oil well, over $25,000.

★**Tex., Dallas** — AIRPORT — City, V. R. Smitham, mgr., voted $5,000,000 bonds, airport, H. Bartholomew, 217 N. 11 St., St. Louis, Mo., consult. engr. CD 11/8—ENR 11/11.

Tex., Dobbins—OIL WELL—Texas Co., 723 San Jacinto, Houston, developing new 10,000 ft. test oil well, W. Rankin survey, abstract 30. Over $25,000.

Tex., El Camp—OIL WELL—Ferguson & Boyle, Wharton, developing 6,000 ft. test oil well, No. 1, J. W. Kubela, 190 acre tract in H & TC survey No. 5. Over $25,000.

Tex., Encino—OIL WELL, etc.—Standard Oil Co. of Texas, Petroleum Bldg., Houston, developing 6,000 ft. test oil well, storage facilities, No. 4, B. G. de Carcia in La Escantada grant. over $25,000.

Tex., Falfurrias—OIL WELL—A. Morrison, Corpus Christi, drilling, developing new 3,200 ft. test oil well on K. J. Hockerland.

Tex., Falfurrias—OIL WELL—Shell Oil Co., Deere Park, Houston, developing new 6,500 ft. test oil well, No. 1, Guaranty State Bank, GC & F survey No. 721, over $25,000.

Tex., Fort Stockton—OIL WELL, etc.—Siemoneit Drilling Co., Inc., and Wahlenmaier Petroleum Co., Petroleum Bldg., Fort Worth, developing 600 ft. test oil well, earthen storage, etc., No. 1, Crockett, Sec. 28, Blk. 2, H & TC survey, No. 721, over $25,000.

†**Tex., Fort Worth** — RADIO RANGE & TRANSMITTER BLDGS., etc.—U. S. Eng., 231 W. Main St., Denison, radio range and transmitter bldgs., gas chamber, finance bldg., vault, freight house units, steel and concrete, Sol. 41-242-44-151.

Tex., Freer—OIL WELL—American Republic Corp., Petroleum Bldg., Houston, drilling, developing 6,000 ft. test oil well, No. 1, L. Grois survey 228. Over $25,000.

Tex., Ganado-Edna—OIL WELLS—Forest Development Corp., Milam Bldg., San Antonio, developing several offset oil wells.

Tex., Ganado—OIL WELL—Seaport Oil Corp., State National Bank Bldg., Houston, developing second 6,000 ft. test oil well, over $25,000.

Tex., Grapeland—OIL WELL, etc.—Grimes & Russell, developing deep test oil well, storage, fuel line, No. 1, A. D. Spence, Porcelia Field. Over $25,000.

Tex., Groveton—OIL WELL—Navarro Oil Co., et al, Jacintonto National Bank Bldg., Houston, 6,000 ft. test oil well, storage facilities fuel line, Blk. 88, H. Bone league, A-75, Over $25,000.

Tex., Harrold — OIL WELL, etc. — British American Oil Producing Co., Oil & Gas Bldg., Dallas, drilling, casing, developing 5,000 ft. test oil well, earthen storage, fuel line, Blk. 93, Waggoner Conoly subdivision, 5 mi. northeast of here. Over $25,000.

Tex., Karnes City—OIL WELL—D. R. Perkins and T. C. Halley, 730 W. 41 St., Houston, developing 2 deep test oil wells, over $25,000.

Tex., Longview—OIL WELL—R. E. Smith, Second National Bank Bldg., Houston, oil well development on A B Spear lease. Over $25,000.

Tex., Los Ebanos—OIL WELL—Osborn & Fleet, et al., Rio Grande City, developing another deep test oil well, over $25,000.

Tex., Markham—OIL WELL—Atlantic Refining Co., Esperson Bldg., Housing, developing 8,500 ft. test oil well, No. 1-B, Kountze tract 9 Sec. 550, W. H. Gainer survey. Over $25,000.

Tex., Millican—OIL WELL, etc.—Phillips Petroleum Co., Esperson Bldg., Houston, developing 4,000 ft. test oil well, storage facilities, J. M. Barrera survey, No. 1, Weems, $25,000.

Tex., Myersville—OIL WELL, etc.—Arkansas Fuel Oil Co., Esperson Bldg., Houston, developing 9,800 ft. test oil well, storage facilities, No. 1, Buehrig. Over $25,000.

Tex., Odem—OIL WELL, etc.—Texas Conservative Oil Co., Corpus Christi, developing 5,500 ft. test oil well, earthen storage facilities, Blk. 17, CEPI and M survey, abstract 312, 2 mi. northeast of here, over $25,000.

Tex., Omaha—OIL WELL, etc.—Bert Fields Drilling Co., and M. Coats, Magnolia Bldg., Dallas, developing deep test oil well, storage facilities, etc., over $25,000.

Tex., Orla—OIL WELL—Johnson & Johnson, Pecos, developing 3,000 ft. exploratory type oil well, SW Sec. 28, Blk. 52, T2, T & P. survey, 10 mi. southwest of here, $25,000.

Tex., Randado—OIL WELL—Massingill and Spice, et al., Alamo National Bldg., San Antonio, developing deep test oil well, 2 mi. southeast of here, No. 1, Rosa Palacios, in Blk. 5, Sec. 232, over $25,000.

★†**Tex., Randolph Field**—RUNWAY, etc.—U. S. Eng., Fort Sam Houston, 150x3,500 ft. runway and 4 taxiways on east side of field. $583,150.

Tex., Randado—OIL WELL—Texas Co., 720 San Jacinto, Houston, developing deep test oil well, No. 3, R. Yeager, survey 222. Over $25,000.

Tex., Runge—OIL WELLS—Perkins & Hadley, Karnes City, developing two 5,000 ft. test oil wells. Over $25,000.

†**Tex., San Angelo**—CRASH TRUCK SHELTERS, etc.—U. S. Eng., Fort Sam Houston, crash truck and cadet shelters, at Goodfellow Auxiliary Landing Fields 5, 6 and 7.

Tex., Seminole—OIL WELL—L. L. Horner, developing 5,500 ft. test oil well, storage facilities, No. 1, G. D. Norman, Sec. 5, Blk. C-45, PSL, 10 mi. southeast of here. Over $25,000.

Tex., Simms—OIL WELL—Continental Oil Co., Eagle Ford Bldg., Dallas, developing another 6,500 ft. test oil well, over $25,000.

Tex., Sour Lake—OIL WELL—Sun Oil Co., Esperson Bldg., Houston, developing 7,500 ft. test oil well, over $25,000.

Tex., Sulphur Springs—OIL WELL—Texas Oil & Gas Co., et al, developing deep test oil well, storage facilities, No. 1, R. Stubbs, T. Lee survey. Over $25,000.

Tex., Tilden—OIL WELL—Atlantic Refining Co., Esperson Bldg., Houston, developing 9,000 ft. test oil well, storage facilities, over $25,000.

Tex., Tilden—OIL WELL—S. F. Hurlbut et al., developing 6,500 ft. test oil well, B. Hughes survey, 36 on Blk. 18, 12 mi. northwest of here, over $25,000.

Tex., Yantis—OIL WELL, etc.—Magnolia Petroleum Co., Magnolia Bldg., Dallas, developing 7,000 ft. test oil well, storage facilities 1½ mi. west of here.

W. Va., Charleston—AIRPORT—Kanawha County, airport, incl. administration bldg., hangars, grading, runways and drainage, CAA.

BIDS ASKED

Bids Asked January 17

†**N. Y., Dunkirk**—AIRPORT FACILITIES—Civil Aeronautics Admin., La Guardia Field, Jackson Heights, relocation airport facilities. CD 1/1—ENR 1/6.

Bids Asked About January 18

★†**O., Aultman**—AIRPORT—Civil Aeronautics Authority, 14 St. and Constitution Ave., Wash., D. C., grading, draining, runways for Canton-Akron Memorial Airport Association, Summit and Stark Counties, To exceed $500,000. Total project $2,000,000. L. O. Casselman, engr. CD 5/6—ENR 5/11.

Bids Asked January 21

B. C., Esquimalt—GRAVING DOCK—K. W. Morton, dist. engr., New Westminster, reconditioning graving dock for Dpt. P. Wks., Ottawa, Ont. Plans deposit $10.

★**Colo., Leadville**—TUNNEL—Denver & Rio Grande Western R.R. Co., A. E. Perlman, ch. engr., Rio Grande Bldg., Denver, 2,000 ft. concrete-lined tunnel. $800,000. Owner furnishes materials. CD 12/6—ENR 12/9.

Bids Asked February 1

†**Calif., Alturas**—AIRPORT—Civil Aeronautics Admin., 1500 4 St., Santa Monica, municipal airport 8 mi. northwest of here, Proj. No. N-64-202. CD 12/7—ENR 12/9.

Bids Asked

★†**Ill., Urbana**—AIRPORT, etc.—Civil Aeronautics Admin., 608 S. Dearborn St., Chicago, airport, 2 runways, 5,800 ft. long, 150 ft. wide, grading, ditch excav., drain tile, paving, etc., near here. Total estimated cost $1,350,000. CD 6/4—ENR 6/10.

Mass., Medford—SWIMMING POOL—Tufts College, L. Carmichael, pres., Medford, reinforced concrete swimming pool Cousens Gymnasium. Over $25,000. A. A. Diriam, 124 Cedar St., Malden, archt. CD 12/8—ENR 12/16.

LOW BIDDERS

†**Colo., Colorado Springs**—TAXIWAYS, etc.—U. S. Eng., 909 17 St., Denver, taxiways and widening taxiways, Peterson Field from W. H. Noel, Jamestown, N. D, $170,949. CD 1[illegible]—ENR 1/6.

†**Tex., Denton**—AIRPORT—Civil Aeronautics Admin., P. O. Box 1689, Fort Worth, Jas. T. airport, clearing, grading, drainage, seeding, etc., from Arcole-Midwest Corp., Box 1[illegible] Pueblo, Colo., Schedules (1) $141,144, (2) $185,000. CD 12/30.

Tex., Houston—LOADING DOCKS—Shell Steel Co. of Texas, Industrial Rd., reinforced steel sheet piling loading dock, from O. Peterson, 6726 Ave. W., $148,000. CD 1/4—ENR 1[illegible]

★†**Tex., Matagorda**—RUNWAYS, etc.—U. S. Eng., 25 St. and Avenue F, Galveston, Jan. 5, runways, taxiways, apron expansion, etc., Sol. 41-224-44-C115, from Consolidated Contractors, Edna, approx. $802,000. CD 12/31.

†**Washington** — POWER LINE — Bonneville Power Admin., P. O. Box 3537, Portland, Dec. 27, power line from Rock Island to Grand Coulee dam, Inv. 3119, from Enterprise Electric Co., 25 E. Lee St., Baltimore, Md., $198,[illegible]

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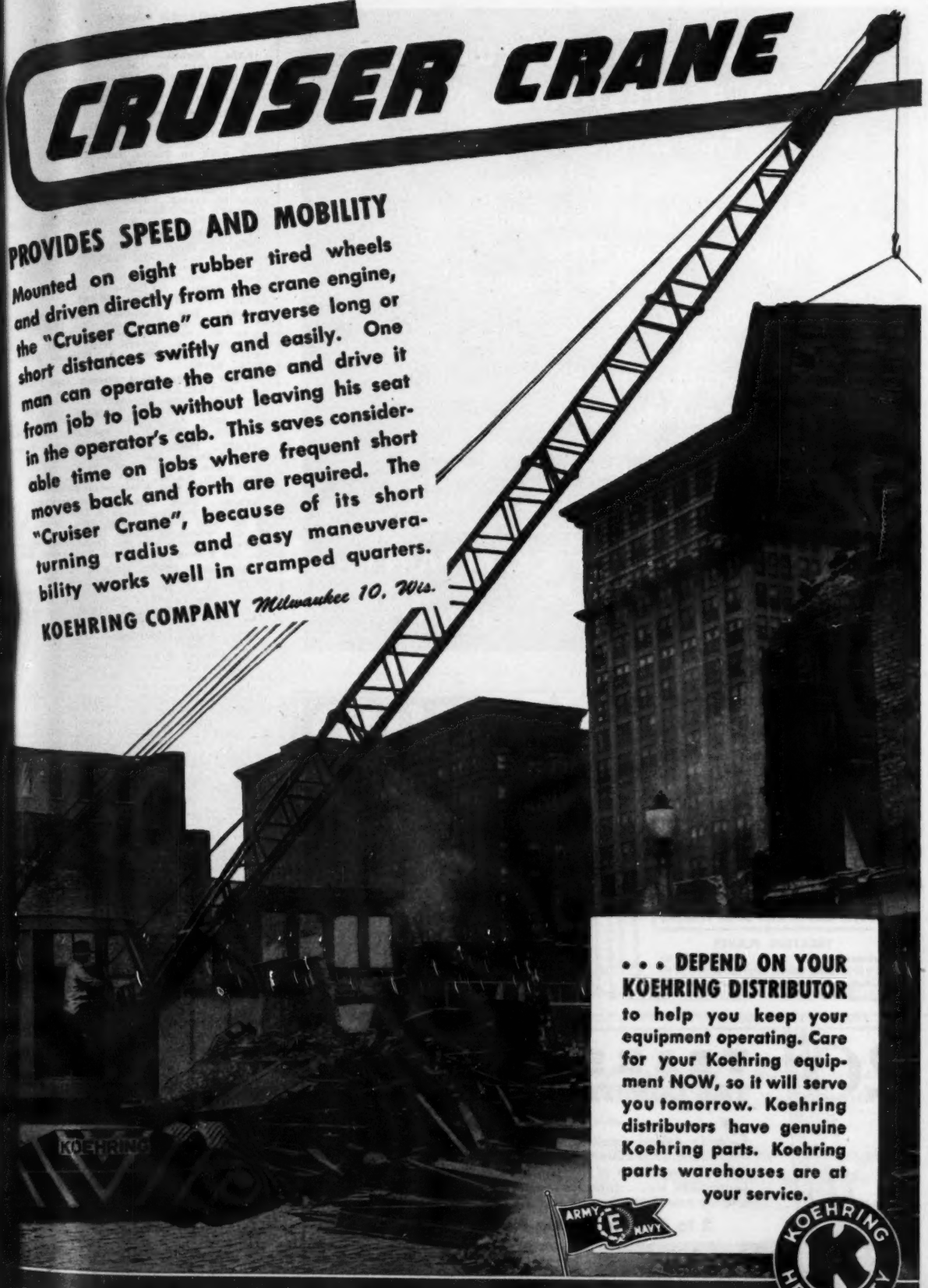

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CONTRACTS AWARDED

†**Ala., Mobile**—AIRFIELD BLDGS.—U. S. Eng., Grant St. west of Westwood St., repairs to engine test cells and engine test bldg., Brookley Field to Cincinnati Mfg. Co., 1000 Evans St., Cincinnati, O., $73,912.

†**Calif., Alameda**—AIR STATION MAGAZINE—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., magazine at outlying fields, Naval Air Station, NOY 6709 to Stolte, Inc., 8451 San Leandro St., Oakland, $169,000.

†**Calif., Burbank**—WARM-UP APRON, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, instal. warm-up apron, taxiway and drainage, Lockheed Air Terminal, No. 2 to Rhoades Bros. & Shofner, 3869 Medford St., Los Angeles, $35,363.

†**Calif., Blythe**—AIR BASE SHOULDER REPAIR and DUST CONTROL—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, shoulder repair and dust control, Army Air Base, Contr. 04-353-eng-215, to Frontier Constr. Co., Whittier, $30,382.

Calif., Los Angeles—CRANE RUNWAY, etc.—Earle M. Jergensen Co., 10,510 S. Alameda St., crane runway and iron housing steel frame to Myers Bros., 3407 San Fernando Rd., $46,000. A. Wilson, Architect, Bldg., archt.

†**Calif., Mills Field (South San Francisco)**—ELECTRICAL WORK—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., electrical work, A A F NOY 8212 to American Electrical Constr. Co., 462 Bryant St., San Francisco, $9,300.

†**Calif., Mills Field**—AIRFIELD BLDG., Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., cafeteria and dope shop, NAAF, NOY 8211, to Parker Bros., 135 S. Park, San Francisco, $157,857.

†**Calif., Port Chicago**—WIDENING SHIP LOADING PIER—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., widening ship loading pier, Naval Magazine, NOY 8391 to Duncanson Harrelson Co., De Young Bldg., San Francisco, $111,000.

†**Delaware**—PIER DEMOLITION—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W. Wash., D. C., demolition of Degaussing Pier, Reedy Island, Delaware Bay, NOY 8 to Merrit-Chapman & Scott, 17 Battery Place, New York, N. Y., $29,114.

†**Fla., Fort Lauderdale**—AIR STATION MACHINE SHOP PIER, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., machine shop pier and shelter and gasoline and oil distr. sys., Port Everglades Boat Operation Station, Naval Air Station, NOY 7138, to Southern States Constr. Co., Congress Bldg., Miami, $30,078. CD 1/4.

†**Fla., Homestead**—AIRFIELD BLDGS.—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 3, temporary frame bldgs., Homestead AAF Contr. 08-123-eng-206, to Lester F. Fra Corp., Miami Beach, $36,993.

†**Fla., Marianna**—AIRFIELD MAT—U. S. Eng., Grant St. west of Westwood St., Mobile, Ala., steel mat at Army Airfield, Sec. 271 to Tharp & Underwood, Montgomery, Ala., $27,160.

†**Fla., Tampa**—AIRFIELD BLDGS.—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 3, temporary frame bldgs., Drew Field, Contr. 08-123-eng-208, to Paul Smith Constr. Co., N. Rome Ave., $30,603.

†**Ga., Atlanta**—HEATING SYSTEM INSTALLATION—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., installation of heating sys., in main hangar bldg., No. 1, N.A.S., NOY 8503 to The Stephenson Co., 14 Harris St. N.W., $24,700.

†**Ga., Marietta**—AIRFIELD EXCAVATION, etc.—U. S. Eng., Post Office Bldg., Savannah, excav., clay backfill, laying pierced plank, etc., Army Air Field, Contr. 09-133-Eng-1 to W. L. Florence Constr. Co., Pow Springs, $74,250.

†**Ga., Tifton**—FIRE PROTECTION SYSTEM—U. S. Eng., Post Office Bldg., Savannah, fire protection sys., and water distr. sys. extn. at Airfield, Ser. No. TIF-1-44, to Nola Constr. Co., 1190 Caroline St. N.W., Atlanta Bids 12/27.

†**Idaho, Pocatello**—SPRINKLER SYSTEM—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., sprinkler sys., Res. Ordnance Storehouse, N.O.P. 8209 to Rushlight Automatic Sprinkler Co., 50 N.E. Farragut St., Portland, Oreg., $32,

†**Kan., Kansas City**—FACILITIES—U. S. Eng., 10 E. 17 St., Kansas City, Mo., addn. facilities, Contr. 23-028-ENG-289, Kans A A P, to J. E. Dunn Constr. Co., Rail Bldg., Kansas City, Mo., $81,242.

†**Kan., Pratt**—AIRFIELD PAVING, etc.—U. S. Eng., 10 E. 17 St., Kansas City, Mo., grading, sub-grade prep., pavement, Army Air Field, Contr. 23-028-Eng-3 Carr & Co., Contractors, Kansas City, $61,504.

†**Kan., Pratt**—UTILITIES, etc.—U. S. Eng., 10 E. 17 St., Kansas City, Mo., utilities, roads and addnl. air base facilities, to K. Eby Const. Co., 311 E. Murdock, Wichita, $176,000.

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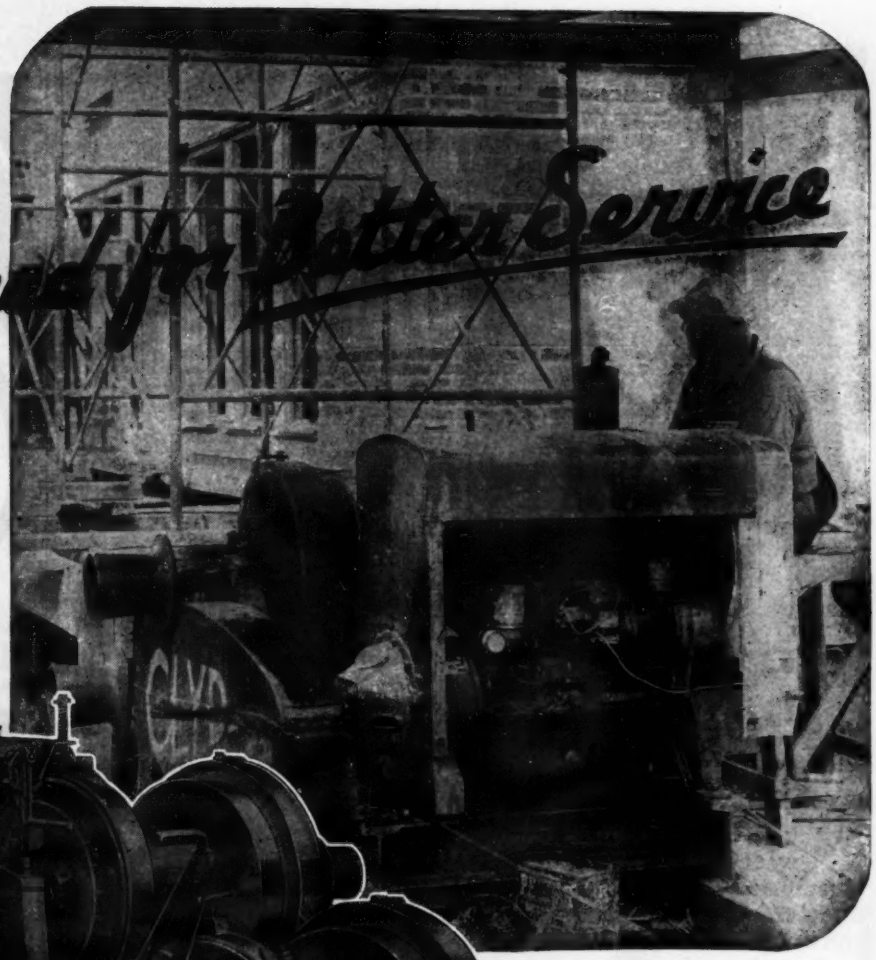

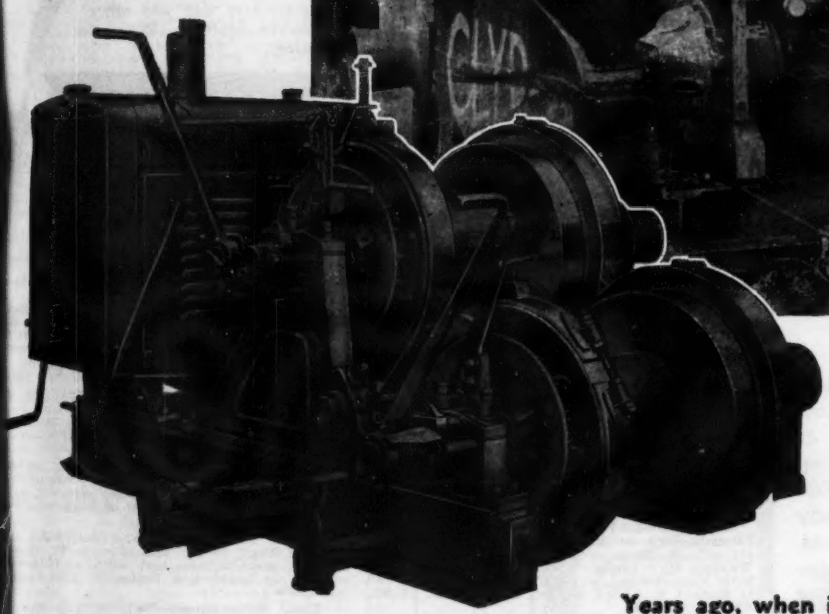

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†**Md., Camp Springs**—FACILITIES—U. S. Eng., First and Douglas Sts. N.W., Wash., D. C., facilities, Contr. 49-080-Eng-49 to W. B. Avery, 629 F St. N.W., Wash., D. C., $376,958.

†**Miss., Camp Shelby**—ALTERATIONS—U. S. Eng., Grant St. west of Westwood St., Mobile, Ala., alterations Contr. 01-076-Eng-145 to Southeastern Mfg. Co., Tuscaloosa, Ala., $99,980.

★†**New Jersey**—PIER—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. trestle ships pier, Naval Ammunition Depot, Earle, NOY 7693, to J. Rich Steers Inc., 17 Battery Pl., New York, N. Y., $2,600,000. Bids 12/14—CD 12/21.

†**N. M., Alamogordo**—AIR BASE CONSTRUCTION—U. S. Eng., 4 and Gold Sts., Albuquerque, addnl. construction at airbase, to Ponsford Bros., 914 E. Missouri St., El Paso, Tex., $25,000.

†**N. Y., Brooklyn**—DRYDOCK REPAIRS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., dry dock repairs, Brooklyn Navy Yard, NOY 7778 to J. Rich Steers, Inc., 17 Battery Pl., New York, $226,084.

†**N. Y., Rome**—AIR DEPOT BLDG.—U. S. Eng., Chimes Bldg., Syracuse, temporary frame bldgs., Air Depot, Contr. 30-180-Eng-16 to John J. Harvey Co., 2242 Whitesboro St., Utica, $59,964, and temporary frame bldg., Contr. 30-180-Eng-18, to Rathgeb-Walsh, Inc., 86 Broad St., Port Chester, $81,024.

†**N. C., Cherry Point**—WARM-UP APRON, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., concrete warm-up apron, etc., Greenville and outlying field, M.C.A., NOY 8294 to Mecklenburg Constr. Co., Durham, $112,850.

†**N. C., Manteo**—APRONS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., concrete apron, A.A.S., NOY 6787 to Norfolk Paving Co., Norfolk, $57,370.

†**O., Columbus**—WALL ENCLOSURE, etc.—U. S. Eng., 532 U. S. Post Office and Courthouse, Cincinnati, wall enclosure and fire walls for building, Contr. 33-015-ENG-177, Columbus ASF Depot, to Darin & Armstrong, Inc., 2041 Fenkel St., Detroit, Mich., $52,888.

†**O., Patterson Field (br. Fairfield)**—AIRFIELD BLDG.—U. S. Eng., Wright Field, bldg., Contr. 33-046-Eng-75 to H. W. Miller, Covington, Ky. $65,359.

†**O., Wright Field (br. Dayton)**—AIRFIELD BLDG.—U. S. Eng., Wright Field, temporary frame bldg., Contr. 33-046-Eng-74 to Simpson Constr. Co., 1113 S. Hermitage St., Chicago, Ill. $127,575.

†**Okla., Oklahoma City**—FACILITIES—U. S. Eng., 415 Wright Bldg., Tulsa, Zone 2, addnl. facilities, Tinker Auxiliary Airfield, Contr. 34-066-ENG-102, to Charles M. Suttle, 12 N.W. 8 St. Est. $104,115.

†**Pa., Fort Mifflin (sta. Phila.)**—FIRE LINE FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., exten. fire line facilities, Naval Ammunition Depot, NOY 7139, to J. N. Driscoll, 27 E. Durham St., Phila., $116,400.

†**Pa., Mechanicsburg**—ADDITIONAL HEATING FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. heating facilities, N. S. D., NOY 7723 to H. B. Alexander & Son, 3 and Vaugh Sts., Harrisburg, $75,027. CD 12/9.

†**Pa., Valley Forge General Hospital (br. Phoenixville)** — ADDITIONAL FACILITIES, etc.—U. S. Eng., Penn Mutual Bldg., 6 and Walnut Sts., Phila., addnl. facilities, utilities with appurtenant work, Contr. 18-020-Eng-240 to Robert E. Lamb & Son, Inc., 843 N. 19 St., Phila. $88,760.

†**R. I., Davisville**—HEATING FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., heating facilities, A. B. D., NOY 8023 to Wm. H. Box Co., 271 Sheldon St., Hartford, Conn. $52,230.

†**R. I., Melville (br. Portsmouth)**—BOUNDARY FENCING—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., boundary fencing, naval fuel and net depot, NOY 8569 to Platt Contracting Co., 169 Bridge St., Cambridge, Mass. $29,943.

†**R. I., Quonset Point**—AIR STATION BLDG.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., celestial navigation trainer bldg., Naval Air Station, NOY 8011 to Coleman Constr. Co., & H. V. Collins, 318 Turks Head Bldg., Providence. $34,065.

†**S. C., Charleston**—AIR BASE BLDG.—U. S. Eng., 83 Customhouse, addnl. prefabricated bldgs., Contr. 38-081-Eng-95 to Skinner & Ruddock, 155 E. Bay St., Box 750, Charleston Co. $51,402.

†**S. C., Florence** — SHOOTING-IN-BUTT — U. S. Eng., Florence, shooting-in-butt, type TAR-C-A, No. 38-081-44-110 Neg., to J. C. Morton, Myrtle Beach, under $25,000. Bids 12/30.

Tex., Edinburg—GAS PIPELINES—J. E. Douglas, 1344 Wichita St., Houston, approx. 36 mi. natural gas pipelines between fields and for well drillings use, force account $40,000. CD 11/15—ENR 11/25.

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★†**Tex., Galveston**—DRY-DOCK—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., dry dock to Horace W. Williams Co., 833 Howard Ave., New Orleans, La., $1,000,000. Brown Shipbuilding Co., Industrial Rd., Houston, Tex., will operate.

†**Tex., Harlingen**—GAS AND FUEL SYSTEM—U. S. Eng., 25 St. and Avenue F, Galveston, gas and fuel sys., Laguna Madre Base, to M. Darby, Pharr, $25,000. CD 12/28 to Pub. Bldgs.

Tex., Hebbronville—OIL WELL, etc.—Standard Oil Co. of Texas, Petroleum Bldg., Houston, drilling deep test oil well, storage facilities, 6 mi. northeast of here. Own force $35,000.

†**Tex., Houston** — INSTALLATIONS, etc.—U. S. Eng., 25 St. and Avenue F, Galveston, addnl. installations and bldg., at Dickson Gun Plant, to Linbeck & Dederick, 1532 Pedee St. $26,000.

Tex., Sweetholme—OIL WELL—Rob. Watson, et al., 502 Caroline St., Houston, developing 8,000 ft. test oil well, to Tonto Drilling Co., Alamo National Bldg., San Antonio, approx. $40,000.

†**Virginia** — SHELTERS, etc. — U. S. Eng., Fort Norfolk, Norfolk, shelters, appurtenant work, Contr. 44-110-Eng-58, Fisherman Island, Northampton Co., to F. J. Gannaway, North Shore Rd., Norfolk, $44,490.

†**Va., Norfolk** — TRACKAGE — U. S. Eng., Fort Norfolk, Norfolk, addnl. trackage, Contr. 44-110-eng-55, Norfolk A A B, to Ashton Ragland, Builders Exchange, Richmond, $785.

†**Wash., Seattle**—AUTOMATIC SPRINKLER SYSTEM—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., automatic sprinkler sys., Naval Hospital, Contr. 7928 to Viking Automatic Sprinkler Co., 8 Ave. S. $34,770.

★†**Wis., Janesville**—AIRPORT—Civil Aeronautics Admin., 608 S. Dearborn St., Chicago, Ill., grading, for airport, for County, to Raemishe Madden, Middleton, $156; paving, to Rock Road Constr. Co., Roger St., Chicago, Ill., $482,774. Bids CD 12/26—ENR 10/28.

★†**Wyoming & Montana**—OIL PIPELINE—Petroleum Administration for War, Interior Bldg., 19 and C Sts. N.W., Wash., D. C., 230 mi. 8 and 10 in. crude oil pipeline between Wyoming-Montana border to vicinity of Casper, to Stanoline Pipe Line Co., Casper, Wyoming, approx. $4,200,000.

UNCLASSIFIED (Contracts Awarded, Cont'd.)

B. C., Esquimalt—SWIMMING POOL—Dpt. National Defense, Ottawa, Ont., swimming pool at Diving Depot, to G. H. Wheaton, 1207 Douglas St., Victoria, $41,000.

Ont., St. Eugene—OUTSIDE SERVICES—Dept. Natl. Defence (Air), Ottawa, outside services at No. 13, E.F.T.S., incl. clearing, grading, drainage, etc. to Bertrand & Frere Constr. Co. Ltd., L'Original, $49,000.

LATIN AMERICA

Mexico—Dpt. Health, Nuevo Leon state, Monterrey, plans water systems, $250,000. and irrigation projects, $250,000. Funds appropriated. CD 11/4—ENR 11/11.

Mexico—Mexican Irrigation Comn., Mexico City, D. F., irrigation systems in northern part of lower California, one 45 mi. south of Calexico, Calif., U. S. A., near Mexicali, and other 10 mi. south of Andrade, involving 1,000,000 cu. yd. excav., to Morrison-Knudsen Co., 411 W. 5 St., Los Angeles, Calif., approx. $300,000.

Mexico—Federal Electrical Comn., National Palace, Mexico City, plans electrification program, incl. $1,200,000 in Vera Cruz, $250,000 in Iriapantonxo, $100,000 in Zumpinto, $70,000 in Colotlipa and $50,000 in Bombana. Total $2,500,000.

Mexico—Federal Government, Mexico City, takes bids in February for repairs, new construction, flood damaged dikes, etc., in Tula, Actopam and Ixmiquilpan. $250,000.

Mexico—Mexican Government, Dpt. Agriculture, Government Palace, Mexico City, plans construction, repairs irrigation projects, $1,100,000.

Mexico—Mexican Government, President Avila Camacho, Presidential Palace, Mexico City, will construct roads various locations in 1944, own forces $30,000,000; Marine Department, Mexican Government, President Avila Camacho, Presidential Palace, Mexico City, plans new countrywide construction and repairs on navy projects, $5,000,000; Mexican Government, Social Security Board, Presidential Palace, Mexico City, plans construction hospitals and clinics in every state, $5,000,000.

Mexico—National Defense Committee, National Palace, Mexico City, will construct military bldgs. in 8 army camps, also military schools, hospitals, etc. by own forces. $30,000,000.

Mexico—National Railroads of Mexico, L. Lona, ch. engr. M.W., 19 Bolivar St., Mexico City, addnl. funds for work on railroads. $5,000,000. Money approved by North American Railroad Comn., and Mexican Government.

Mexico—State of Nayarit, C. Francisco Garcia Montero, presidente municipal, Ixtlan, will construct new roads in state, incl. $30,000 project in Mercado. Own forces. Total est. $50,000.

Mexico, Altotonga—City, plans agricultural bldgs., some irrigation for new agricultural project. $250,000.

Mexico, Coahuila—State, Lopez Padillo, Governor's Palace, Saltillo, will construct roads throughout state, incl. Chuchillaguata and Matamoros-Viesca stretches; own forces. $850,000.

Mexico, Jilotepec—City plans hospital. $75,000.

Mexico, Jiminez—City, Municipal Hall, plans reservoir for water sys. (drinking, irrigation), to be in Las Gallinas canyon near city, $50,000.

Mexico, Mexico City—Central Dept. Federal Dist., Mexico City, plans constructing road between Calle, Republica de Brasil and Calle Gabriel Leyva, also widening several streets in northern sector of city. $500,000.

Mexico, Mexico City—Latino-American Ins. Co., Madero No. 1, Mexico City, plans theatre, Paseo de la reforma, $1,000,000.

Mexico, Mexico City—Bullfighters' Union, Mexico City, hospital for bullfighters, $250,000.

Mexico, Mexico City—Federal Dist., Lic. Jose Gomez, Mexico City, plans construction agricultural farm school for workers in Federal District, near Topilejo. $250,000.

Mexico, Mexico City—Federal Dist. Government, Palacio Municipal, Mexico, D. F., plans public markets. $2,500,000.

Mexico, Monterrey—State of Nuevo Leon and Associated Interests, Monterrey, plans constructing, equipping refrigeration plant for preserving citrus fruits. Over $40,000.

Mexico, Monterrey—Nuevo Leon Government, Palacio del Estado, Monterrey, plans 100 bed sanatorium, nurses home, 200 bed hospital, nurses home and school. $500,000.

Mexico, Nuevo Laredo—City, plans city auditorium. $150,000.

Mexico, Poza Rica—Sindicato de Trabajadores Petroleros, Poza Rica, plans school and hospital. $330,000.

Mexico, Poza Rica—Petroleos Mexicana, Poza Rica, plans constructing several booster pumping stations for 180 mi. 10 in. crude oil line. $125,000.

Mexico, Puebla—State of Puebla, Gov. Rafael Bautista, Puebla, plans 200 Colonial type homes for state workers. $250,000.

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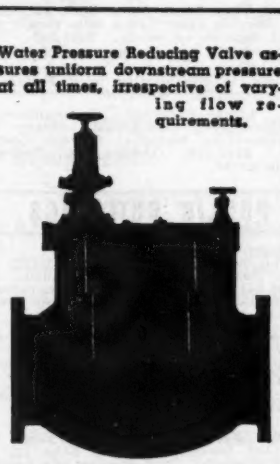

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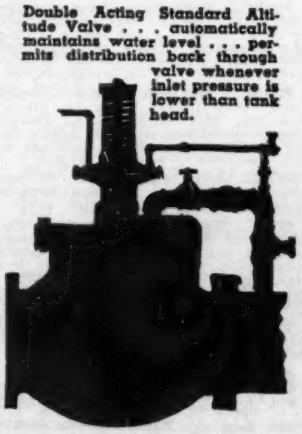

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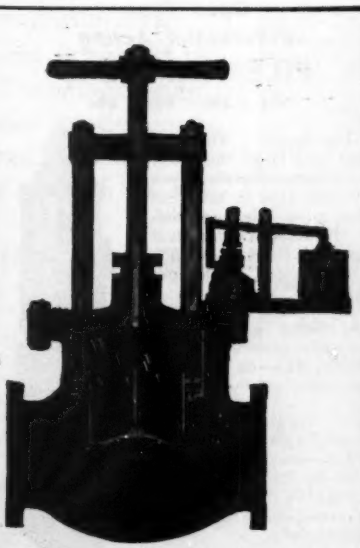

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LATIN AMERICA (Cont'd.)

Mexico, Sabinas—City, Dr. Raul Ramos Gonzales, head Municipal Govt., Sabinas, takes bids within 60 days city hall, new main plaza. $200,000.

Mexico, Saltillo—City, will construct new roads, repairing existing ones, own forces, $350,000; City, Ignacio Zepeda Davalos, mayor, Municipal Hall, takes bids within 60 days, new water sys. $360,000; plans modern schoolhouse, $158,000, Juan Reyes, Municipal Hall, engr.

Mexico, Tampico—Mexican Government, Scrita. de Hacienda, Palacio National, Mexico, D. F., plans building to house offices of Ministry of Finance and the Port Captain. $300,000. Juan Mainero, Scrita. de Hacienda, Palacio Nacional, Mexico, D. F., engr.

Mexico, Tampico — Petroleos Mexicanos, Mexico City, plans constructing polyclinic hospital, $250,000.

Mexico, Tampico — Petroleos Mexicanos, Tampico, plans developing large number of oil wells located in Ponza Rica fields, steel and earthen storage facilities, fuel lines for drilling, etc.

Mexico, Torreon—City, plans city market. $200,000.

Mexico, Vera Cruz—State of Vera Cruz, Gobierno Estado, Vera Cruz, plans constructing roads as follows, Jalapa-Coatepec-Teocelo, $46,000; Tamarindo-Chachalacas $3,000,000; Yolotepec-Jalapa; Vera Cruz, $124,500; Las Cumbres de Acultzingo-Cordoba-Boticaria, $379,100; and Coatzacoalcos-Mititlan $37,800. Total est. $3,507,000.

Mexico, Vera Cruz—Dpt. of Navy, Mexican Federal Govt., Mexico City, receiving bids constructing causeway between mainland and San Juan Island. $600,000.

Mexico, Vera Cruz—Navy Dpt., Government Palace, Mexico City, plans new repair docks, shipyard repairs to yards. $125,000.

Mexico, Villa Acuna—City of Villa Acuna, Municipal Hall, plans new irrigation project, Las Vacas, in conjunction with Federal and state of Coahuila. $100,000.

Peru, Lima—Peruvian Government, Dr. Jorge Basadre, dir. National Library, Lima, plans rebuilding National Library destroyed by fire. $950,000. Emilio Hart-Terre, c/o owner is archt.

PUBLIC BUILDINGS

PROPOSED WORK

†**Ala., Sayer**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 140 family dwelling units, Ala. 1227.

†**Ariz., Wickenburg**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Calif., 20 family dwelling units, stop-gap, Ariz. 2342.

†**Calif., Barstow**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 60 dormitories, Calif. 4800; 60 family dwelling units, Calif. 4801.

†**Calif., Berkeley**—Home Owners' Loan Corp., 1440 Bway., Oakland, Zone 12, plans by J. I. Easterly, 2419 McGee Ave., converting commercial bldg. at 1518 Shattuck Ave., providing 6 living units for in-migrant war workers, Case No. W4B-1329, $12,000.

†**Calif., Berkeley**—Home Owners' Loan Corp., 1440 Bway., Oakland, Zone 12, plans by J. I. Easterly, 1440 Bway., Oakland, Zone 12, converting 2 flats at 1821-23 Hearst St. providing 4 living units for in-migrant war workers, Case No. W4B-1209, $8,000.

†**Calif., Oakland**—Home Owners' Loan Corp., 1440 Bway., Zone 12, plans by J. I. Easterly, 2419 McGee Ave., Berkeley, converting residence at 2023 Curtis St., providing 4 living units for in-migrant war workers, Case No. W4B-1372, $8,000.

†**Calif., Los Angeles**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 1,000 family dwelling units, Calif. 4807.

†**Calif., Martinez**—Contra Costa Co. Housing Auth., 700 D St., indefinitely postponed bids to have been opened Jan. 12, administration bldg. addn., Alhambra Terrace Proj., Calif. 11-1, for NHA. K. O. Narbett, E. Geoffrey Bangs & E. T. Spencer, 605 Market St., San Francisco, archts. CD 1/4.

†**Calif., San Francisco**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 1,000 family dwelling units, Calif. 4808.

†**Calif., Vallejo**—City of Vallejo Housing Auth., Victory Apts., Ryder St., rejected bids Dec. 9, 500 dormitories, Calif. 4768, for NHA. T. C. Bernardi, J. D. Wickenden, F. L. Langhorst & J. C. Funk, Assoc. Architects, 402 Jackson St., San Francisco, archts. CD 12/14—ENR 12/16 under LB.

†**Conn., Bristol**—Pub. Housing Auth., NHA, 24 School St., Boston, altering war housing, Conn. 6200.

†**Conn., Southington**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., altering frame war housing, Conn. 6161.

†**Conn., Stratford**—Wm. H. Shea, town mgr., Town Hall, revised plans by F. H. Beckwith, 115 Wall St., Bridgeport, 10 room addn., Birdseye School, FWA. CD 10/29—ENR 11/4.

†**District of Columbia** and **Virginia**—Pub. Housing Auth., NHA Temporary Bldg., 2 and D Sts. N.W., Wash., D. C., increase 130 family dwelling units to 166 permanent family dwelling units, Proj. 4-3. CD 10/1—ENR 10/14.

†**Fla., Mariana**—Federal Works Agency, and F Sts. N.W., Wash., 25, D. C., hospital addn. $64,000.

†**Idaho, Glenns Ferry**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, 1, Wash., 50 unit family, stop-gap housing, Idaho 10114.

†**Idaho, Triumph**—Pub. Housing Auth., NHA, Skinner Bldg., Fifth Ave., Union St., Seattle, 1, Wash., rejected bids, Dec. 12, 20 trailer housing units, Idaho 10113. Morrison & Jacobsen, 719 2 Ave. Bldg., Seattle, Wash., archts. CD 12/9.

Ill., Robbins—Bd. Educ., plans by R. Harold Zook, 140 S. Dearborn St., Chicago, school addn., also health clinic. $175,000. Applying for FWA funds.

†**Ill., Rock Island**—St. Anthony's Hospital, 767 30 St., plans by W. Schulzke, 1630 5 Ave., Moline, nurses' home. $230,801. FWA.

†**Ind., Indianapolis**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., cancelled bids opened Dec. 3, for housing projects Ind. 12178 and Ind. 12179. Will be consolidated under Ind. 12180. CD 11/15—ENR 11/25 under BA.

†**Ia., Clinton**—Climax Engineering Co., Clinton, enlarging factory. $100,000. Defense Plant Corp. will finance.

†**Kan., Kansas City**—Douglass Hospital, 1310 Quindaro St., plans by Bloomgarten & Frankwerk, Fidelity Bldg., Kansas City, Mo., modeling 7 story hospital, Kan. 14-254. $140,000. FWA. CD 9/9—ENR 9/16.

†**Maryland**—Yards & Docks, Navy Dept., 18 St. and Constitution Ave., N. W. Wash., D. C., bids soon, remodeling houses, Randle Cliff.

†**Md., Baltimore**—Franklin Square Hospital, 110 N. Calhoun St., plans by W. C. Emmart, Munsey Bldg., nurses' home. FWA.

†**Md., Baltimore**—South Baltimore General Hospital, 1213 Light St., plans by Palmer & Lamdin, 1020 St. Paul St., nurses' home. FWA.

†**Md., Great Mills**—Federal Works Agency, 606 State Planters Bank Bldg., Richmond 19, Va., plans by J. L. Baldwin and D. Johanners, Jr., 927 15 St. N.W., Wash., D. C., and soon takes bids school, Md. 1180. $172,000.

Mich., Detroit—Bd. Education, Wayne University, 1354 Bway., plans by S. Pilafian, 1 Madison Ave., student center bldg. $150,000.

†**Mo., Fort Leonard Wood** (br. St. Louis)—Pub. Housing Auth., NHA, Dierks Bldg., 10 Grand Ave., Kansas City Mo., 180 unit family dwellings, Mo. 23077; 80 unit dormitory housing, Mo. 23078.

★†**New Jersey**—Heyden Chemical Corp., 1 Union Square, New York, N. Y., addn. to plant facilities, Mercer Co. $980,000. Defense Plant Corp. will finance.

†**New Jersey**—Turbo Engineering Corp., 1 Nottingham Way, Trenton, addnl. plant facilities, Mercer Co. $145,000. Defense Plant Corp. will finance.

★†**O., Cleveland**—National Bronze & Aluminum Co., W. H. Curtin, asst. to pres., E. 88 St. and Laisy Ave., plans by E. George and W. R. Hargett, 9400 Quincy Ave., altering factory, incl. new furnaces, heat treating, conveyors, machinery, E. 45 St. & Hamilton Ave. $1,500,000 grant, and facility alterations and new machinery, E. 88 St. & Laisy Ave. $430,000 grant. Defense Plant Corp. will finance.

†**O., Rittman**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 100 unit family dwellings, Ohio 33290.

Ore., Bend—Pub. Housing Auth., NHA, Skinner Bldg., Fifth Ave., Union St., Seattle 1, Wash., 50 trailer housing units, Ore. 35289.

†**Ore., Tillamook**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Zone 1, Wash., 20 unit family dwellings, Ore. 35290.

†**Pa., Chambersburg**—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., revised plans 172 unit family housing, Pa. 36418, Nov. 11, rejected. CD 12/1—ENR 12/9, under LB.

†**Pa., Phila.**—St. Lukes Children's Hospital, Thompson and Franklin Sts., laboratory $11,000. FWA gr. allotted.

Tex., Port Lavaca—F. M. Dudgeon, mgr., City Hall, 3 story, rein.-con. and structural clay tile freeze plant, incl. freight elevator, 2 gas engines, refrigeration equipment, $150,000. Garrett Engineering Co., Milam St., Houston, engrs.

†**Va., Staunton**—U. S. Eng., 1 and D Sts. N.W., Wash., D. C., bids soon, hosp. bldg.

†**Wash., Pasco**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Zone 1, 40 unit family dwellings, WP 45252.

LIC BUILDINGS (Proposed Work, Cont'd.)

Wash., Sunnyside—Pub. Housing Auth., HA, Skinner Bldg., 5 Ave. and Union St., ttle, Zone 1, 100 unit family dwellings, sh. 45253; 40 unit family dwellings, Wash. 254.

C., Esquimalt—Federal Dpt. Pub. Wks., awa, Ont., rein.-con. hospital.

N. S., Halifax—Dpt. P. Wks., Ottawa, Ont., plans by C. D. Sutherland, c/o owner, rmanent military hospital at Camp Hill, 000,000.

Ont., Ottawa—Wartime Housing Ltd., 55 York St., Toronto, addnl. house and build- conversion $500,000.

S ASKED

Bids Asked January 17

Me., Presque Isle—U. S. Eng., 31 St. nes Ave., Boston, Mass., bldg. and parking s, 19-023-44-Neg156, $10,000.

Bids Asked January 18

Mich., Niles—Pawating Hospital, c/o Niles pital Assoc., Niles, 3 story, brick, concrete pital. FWA. Schmidt, Garden & Erikson, S. Michigan Ave., Chicago, Ill., archts. 9/8—ENR 9/23.

North Carolina—U. S. Eng., Florence, S. C., rehouse SH-A-T Mod., Laurinburg and tton, Robeson and Scotland Counties.

Pa., Chester—Bd. Educ., Chester Twp., ol bldg., Pa. 36218. $66,412. FWA.

C., Charleston—U. S. Eng., 33 Custom- se, recreation bldg., No. 38-081-44-89.

C., Parris Island—Yards & Docks, Navy 18 St. and Constitution Ave. N.W., h., D. C., BOQ bldg., NOY 7478, pros- ic laboratory, NOY 7771. Extended date. 12/15.

t., Ottawa—Secty., Dpt. P. Wks., Ottawa, inistration bldg., and pavilions, Rideau th and Occupational Centre, about $200,- Plans deposit $50. C. D. Sutherland, c/o rs, archt.

Bids Asked After January 18

ss., Dorchester—St. Mary's Infant Asy- and Lying-In Hospital. 90 Cushing Ave., ory brick, concrete training school for e, Cushing St., Docket, Mass. 18-185, $32,- FWA. T. F. McDonough, 168 Dartmouth Boston, archt. CD 1/3—ENR 1/6.

Bids Asked January 20

ss., Groton—Pub. Housing Auth., NHA, School St., Boston, Mass., war housing ations, Conn. 6013. Plans deposit $50 for set and $10 for ea. addnl. set. CD 12/23 R 12/30.

e., South Portland—Pub. Housing Auth., 24 School St., Boston, Mass., brick d, Me. 17038. Miller & Beal, Inc., 465 ress St., Portland, and Desmond & Lord. con St., Boston, Mass., archts. H. E. Bal- 177 State St., Boston, Mass., engr. Plans nit $50 first set and $10 each addnl. set. 1/21—ENR 12/23.

Bids Asked January 21

b., Bellevue—Pub. Housing Auth., NHA, e Bldg., 1006 Grand Ave., Kansas City. trailer camp Henningson Eng. Co., Stand- Oil Bldg., Omaha, engrs. CD 11/9—ENR

Bids Asked January 25

., Tampa—Housing Auth. of City of a, Wallace S. Bldg., 500 permanent dwelling units, incl. community bldg. hild welfare center, Fla. 3-4. M. Leo Citizens Bldg., archt. CD 11/3—ENR

Bids Asked About January 26

., Brunswick—Pub. Bldgs. Admin., 18 Sts. N.W., Wash., D. C., recreation Ga. 9-143. Extended date. F. L. 809 Marietta Bldg., Atlanta, archt. 29—ENR 1/6.

., New Orleans—New Orleans Housing 236 Carondelet St., 500 unit dwellings, a Ave., La. 1-4, for NHA. Benson, er & Spink, 1020 Carondelet Bldg., Plans deposit $100. CD 1/4—ENR

Bids Asked January 27

C., Charleston—At office F. O. Bates, Main Bldg. Roper Hospital, Lucas St., nit New Roper Hospital, SC 38-139. Plans deposit $50. Samuel Hannaford 1024 Dixie Terminal Bldg., Cleveland, hts. CD 10/14—ENR 10/21.

Bids Asked January 28

., Phoenix—Pub. Bldgs. Admin., 18 Sts. N.W., Wash., D. C., nurses home, nica's Hospital, Ariz. 3-134-2.

., Sparrows Point—Pub. Housing Auth., Temporary Bldg. #2, 19 and D Sts. Wash., D. C., 400 unit temporary g units, Md. 18252. Extended date. 10.

Bids Asked About January 31

., Portland—Pub. Bldgs. Admin., 18 Sts. N.W., Wash., D. C., Guild Lake Ore. 35-167. F. Manson White, 1314 and Ave., archt.

Bids Asked After February 1

., Long Branch—Long Branch Hous- th., 138 Garfield Court, management nic bldg., N. J. 8-1, for NHA. CD ENR 12/16.

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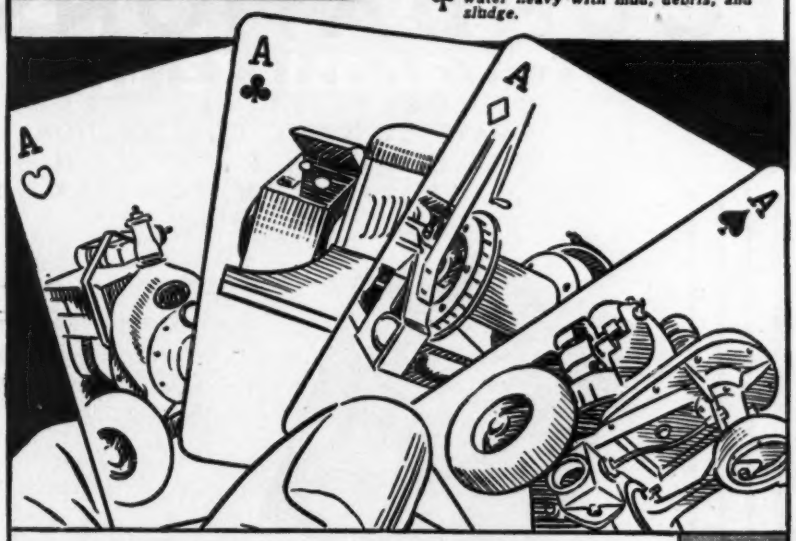

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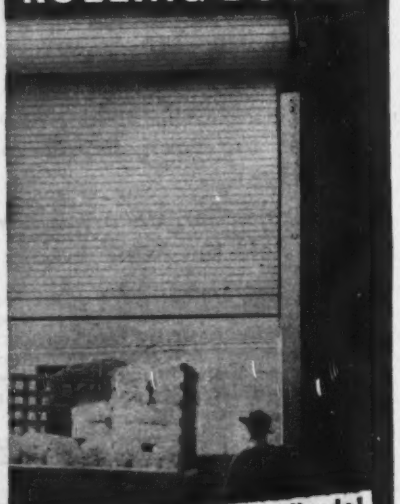

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KINNEAR ROLLING DOORS

PUBLIC BLDGS. (Bids Asked. Cont'd.)

†**Calif., Alameda**—Pub. Bldgs. Admin., [illegible] and F Sts. N.W., Wash., D. C., schools facilities, incl. Unit 1, 14 classrooms, Estuary Proj., Calif. 4-543-1, and Unit 2, 8 classrooms, Webster Proj., Calif. 4-543-2. Ernest J. Kump Co., 251 Kearny St., San Francisco, archts. CD 11/1—ENR 11/4.

LOW BIDDERS

†**Calif., San Bernardino**—Federal Works Agency, 1206 Santee St., Los Angeles, Dist. 25, two 13 room, wood frame schools, Calif. 4-931 F, from Baruch Corp., 625 S. Olive St., Los Angeles, **$152,629.** W. L. Culver, Jr., 20 Fuller Bldg., and Marsh, Smith & Powell, Architects Bldg., Los Angeles, archts.

★†**Calif., Vallejo**—City of Vallejo Housing Auth., Victory Apts., Ryder St., Jan. 1, 1,000 family dwelling units, community bldg., Flodsden School area, Calif. 4767, for NHA, from Robert McCarthy Co., 1050 Kirkham St., San Francisco, **$1,744,879.** CD 12/21—ENR 12/23.

†**D. C., Bellevue**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., Jan. 5, laboratory No. 16, Naval Research Laboratory, NOY 6308, from Ross Engineering Co., 2308 14 St. N.W., Wash., **$258,000.** CD 12/29.

★†**Idaho, Farragut**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., Dec. 29, naval hospital addn., from Sound-Kiewit Constr. Co., Northern Life Tower, Seattle, 1, Wash., **$1,200,962.** CD 12/15.

†**Md., Aberdeen**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts., N.W., Wash., D. C., Jan. 5, 176 unit family dwellings, Md. 18267, from F. H. Wilson, Ardmore, Pa., **$223,750.** CD 1/4—ENR 12/16.

★†**Md., Baltimore** —, Baltimore Housing Auth., 709 E. Eager St., Jan. 4, 400 unit temporary housing, Md. 18250, for NHA, from Tovell Constr. Co., 402 W. Monument St., **$1,123,000.** CD 12/10—ENR 9/30.

†**Miss., Pascagoula**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 180 unit housing, Miss. 22178, from A. Blair, First National Bank Bldg., Montgomery, Ala., masonry, **$438,000,** frame **$413,000.**

†**Mont., Great Falls**—Pub. Housing Auth., NHA, Skinner Bldg., Seattle, 1, Wash., Dec. 31, 100 unit housing, Mont. 42030, from Lee Askevold, Great Falls, **$232,210.** CD 12/1—ENR 12/16.

†**N. Y. Rockville Centre**—Mercy Hospital, N. Village Ave., Jan. 7, hospital addn., H. 33-231, from Yorktown Constr. Co., Inc., 24 E. 149 St., New York, **$288,700.** FWA. CD 12/15—ENR 12/23.

†**S. C., North Charleston (br. Charleston)**—U. S. Eng., 33 Customhouse, Charleston, Dec. 28, maintenance and repair shop at port embarkation, No. 38-081-44-111, from Daves Engr. Co. Inc., 10 Gillon St., Charleston, under **$50,000.**

CONTRACTS AWARDED

★†**Calif., Herlong**—Pub. Housing Auth., [illegible] Market St., San Francisco, 300 family dwelling units, Calif. 4794 and community bldg. serving housing project, Calif. 4767, James I. Barnes Constr. Co., 941 Russ Bldg., San Francisco, **$736,000.** CD 12/28—ENR 12/30 under LB.

★†**Calif., Port Hueneme**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., procurement, operation, electrical installation, site imprvs., Advance Base Depot, NOY 8173 to Raymond Concrete Pile Co., Turner Constr. Co., and Morrison Knudsen Co., 420 Lexington Ave., New York N. Y., **$44,777,375,** cost plus fixed fee.

†**Conn., Stratford**—Chance Vought [illegible] United Aircraft Corp., 550 Main St., 1 story, 50x295 ft. rein.-con. engineering plant addn., to E. & F. Constr. Co., 94 Wells St., Bridgeport, **$200,000.** Albert Kahn Assoc. Engrs. & Architects, Inc., 345 New Center Bldg., Detroit, Mich., engrs.

★†**Illinois—Saginaw** Malleable Iron, [illegible] General Motors Corp., General Motors Bldg., Detroit, Mich., 1 and 2 story, 254x[illegible] ft., brick, rein-con. malleable iron factory and office, to Thorgersen & Erickson, 228 N. La Salle St., Chicago. Est. $2,000,000. Defense Plant Corp. will finance. Albert Kahn Assoc. Engrs. & Archts., 345 New Center Bldg., Detroit, Mich., archts.-engrs. CD 11/10—ENR 11/1.

†**Ill., Chicago**—U. S. Eng., 520 Merchandise Mart, storage rooms, Chicago Signal Depot, Contr. 11-032-Eng-623, to Coath & Gens, 228 N. La Salle St., **$49,720.**

★†**Miss., Pascagoula**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 140 dwellings, Miss. 22177, to R. P. Farnsworth Co., Inc., 1515 S. Salcedo St., New Orleans, La., **$1,168,000.** Bids 12/29. CD 1/5—ENR 1/6 under LB.

†**Mass., Waltham**—Bethlehem Steel Co., Howard St., Quincy, 1 story, 160x[illegible] cafeteria bldg., at Raytheon Mfg. Co., to Harty-Blaney Co., 25 Huntington Ave., Boston, for Navy Dpt. CD 12/22.

†**Mich., Muskegon**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., site imprvs. and community bldg., for housing, 20216, to W. B. Gibson Co., 200 Chestnut St., Warren, O., **$154,000.** Bids 11/22, award 1/4. CD 10/6—ENR 10/14.

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†Utah, Ogden—U. S. Eng., 580 S. State St., Salt Lake City, processing and boxing plant at U.S.F.S. Depot, to R. E. McKee, 4700 San Fernando Rd. W., Los Angeles, Calif., approx. $3,000. Bids 12/20.

†Va., Camp Patrick Henry (br. Newport News)—U. S. Eng., Fort Norfolk, Norfolk, central heating plant for army camp to Grannis, Thompson, Street & Wattinger, Builders Exchange, Charlotte, N. C., $62,000. Awarded 1/4.

†Va., Quantico—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., D. C., B O Q. messhall, WOQ and addn. to dispensary, M C A8, Project NOY 7780, to Alfress-Dyer, Inc., 1741 "K" St. N.W., Wash., D. C., $291,905. Bids 1/4. CD 12/29

†Wash., Auburn—U. S. Eng., 800 3 Ave., Seattle, Zone 4, cold storage plant, Contr. 45-108-Eng-453, Auburn Depot, to Cecil R. Heal, 730 Republic Bldg., Seattle. Est. $74,112.

†Wis., Eau Claire—Western Electric Co. Inc., 22 St. and 48 Ave., Cicero, Ill., remodel- for ordnance plant for manufacturing plant, A. L. Jackson Co. Inc., 161 E. Erie St., Chicago, Ill. Defense Plant Corp. will finance.

†Wis., Eau Claire—U. S. Rubber Co., Eau Claire, altering, constructing, 4 story, 133x500 rubber tire factory addn., to George A. Fuller Const. Co., 111 W. Washington St., Chicago, Ill. J. G. Turnbull, Inc., 2630 Chester Ave., Cleveland, O., engrs. Defense Plant Corp. will finance.

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Los Angeles—The Variety Club, Ambassador Hotel, plans by S. Chas. Lee, 3 Wilshire Blvd., 50x150 ft., 1 story, reinforced-con. clinic, designed to carry 2nd story, air conditioning, etc., $150,000.

Calif., San Leandro—C. P. Pond, 111 E. 14 Ave., 102 housing units. Over $150,000.

Conn., Manchester—Owner, c/o J. E. Kane, 36 Pearl St., Hartford, archt., 4 story, brick and steel 60 room hotel, $150,000.

Mass., Holyoke—Young Mens Christian Association, 367 High St., brick and steel USCA units, Pine St., $400,000.

Minn., Rochester—St. Mary's Hospital, c/o Archt., plans by Ellerbe & Co., 1021 E. First National Bank Bldg., St. Paul, student nurses home, reinforced-con., brick and tile, etc. Est. $1,000,000.

Tex., Houston—San Jacinto Homes, Inc., 1001 West Bldg., Houston, frame type dwellings, Zoe and Majestic Sts., $150,000.

Tex., San Antonio—Mrs. Wm. P. McKelsey, Milam Bldg., and 231 North Drive, San Antonio, 60 frame type dwellings, Cavalier and Zamora Sts., $275,000.

Tex., San Antonio—San Antonio Housing, 1114 Alamo National Bldg., 33 dwelling facilities, utilities, etc., $150,000.

Tex., San Antonio—Texas Development Co., Alamo National Bldg., plans by N. Straus Each, Alamo National Bldg., 2 or more story, brick veneer apartment bldg. $150,000.

Vt., St. Albans—Kerbs Memorial Hospital, Inc., plans by Voorhees Walker Foley & Smith, 101 Park Ave., New York, archts., bids soon brick and steel hospital- nurses home and student training school, $1,000,000. CD 12/10—ENR 12/16.

CONTRACTS AWARDED

Calif., Alameda—Merritt Bldg. Co., seventy- 1 story, residences to W. Spivock, 1734 Webster St., Oakland, $346,000. A. H. Hamberg, 2 Norwood Ave., Berkeley, archt.

Calif., East Los Angeles (br. Los Angeles)—Realty Constr. Co., 5945 E. Washington Blvd., Los Angeles, 153 frame and stucco dwellings. Owner builds. Est. $300,000. J. R. Friend, 132 W. 8 St., San Pedro, archt. CD 11/1—ENR 11/4.

Calif., Gardena—Thos. C. Bowles, 8941 Santa Monica Blvd., Los Angeles, 108 frame and stucco dwellings. Owner builds. Over $300,000.

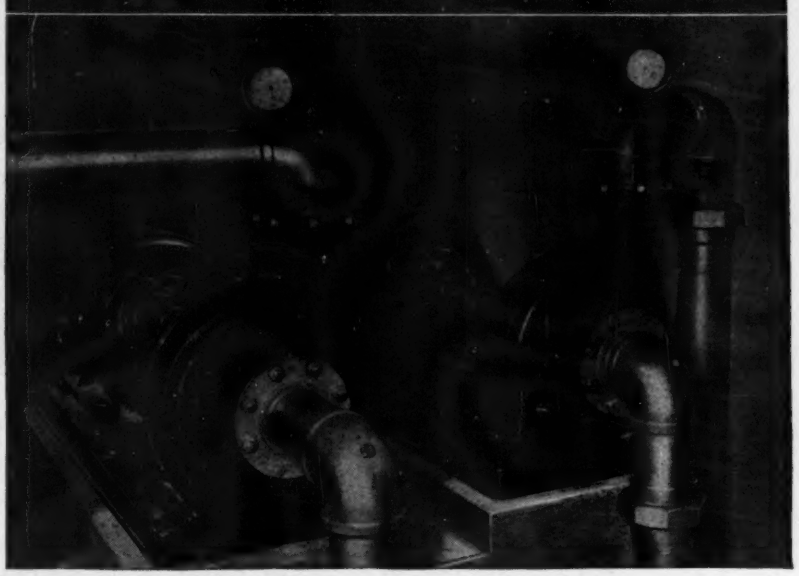
Calif., Lakewood Village—Fourth Defense Housing Corp., 4700 Clark Ave., 100 frame and stucco dwellings. Owner builds. $350,- M. W. Baird, 947 W. Isabel St., Glendale, archt.

Calif., Lakewood Village—Mayfair Housing Corp., 9437 Santa Monica Blvd., Beverly Hills, 209 frame and stucco dwellings near here. Owner builds, over $500,000.

Calif., San Bernardino—A. J. Morris Building Inc., 1643 Wilshire Blvd., Los Angeles, frame and stucco dwellings. Owner builds, $150,000. S. Charles Lee, 1643 Wilshire Blvd., Los Angeles, archt.

Calif., San Pedro—San Pedro Housing Co., 7 & 8 St., 280 frame and stucco, multiple housing units. Owner builds. $150,000. J. R. Friend, 132 W. 8 St., archt.

Special Features
IN STANDARD PUMPS



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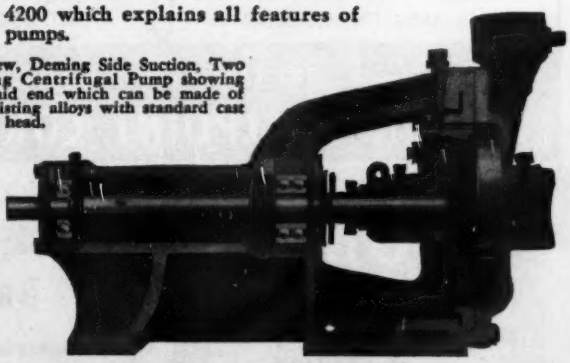

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COMM. BUILDINGS (Contracts Awarded, Cont'd)

Conn., Stamford—Old Colony Homes, Inc., Cathlow Driv., Riverside, 55 family unit brick, masonry apartments to N. Kell Woodside Village, $350,000. W. J. Provos 421 Main St., archt.

Pa., Phila.—Queen Lane Village, Inc., W. Rockland St., twenty duplex apartment 2800 block Midvale Ave. in Queen Lane se to A. P. Orleans & Co., 100 W. Rockla St., $200,000. FHA.

★**Pa., Phila.**—Sylvester Homes, Inc., Airdrie Sts., 100 dwellings, Sylvester an Vankirk Sts. to Boardman-Smith Co., Airdrie Sts., $500,000. FHA.

Pa., Pittsburgh—M. A. Paul, 4066 Liber St., 3 story, bsmnt., 59x100 ft., brick an cinder block apartment. Separate contra P. Friedman, 5509 Avondale St., archt.

Tex., Houston—Reo Constr. Co., West Bldg. 26 frame type dwellings, utilities. Force-a count, approx. $150,000. CD 11/11—EN 11/18.

INDUSTRIAL BUILDINGS

BIDS ASKED

Bids Asked January 17

Conn., Naugatuck—PLANT UNITS—Naug tuck Chemical Div. U. S. Rubber Co., 211 Sta St., Bridgeport, 1 story, brick, steel brine pu cation unit and 2 story, frame storage u Over $40,000. Fletcher Thompson, Inc., State St., Bridgeport, engr. CD 8/24—EN 8/26.

Bids Asked January 29

N. C., Marshall—POWER PLANT—Fren Broad Electric Membership Corp., Marsha Project N C 46-G, power plant bldg. with ma chinery installed. Extended date. Plans dep $25. J. B. McCrary Corp., 22 Marietta St. N Atlanta, Ga., engrs.-archts. CD 12/2—EN 12/9.

Bids Asked

Tex., Carthage—PLANT—Chicago Corp Continental Bldg., Dallas, recycling plant. C 11/17—ENR 11/25.

Yukon Territory, Whitehorse — ROUN HOUSE—White Pass & Yukon Route, C. Rogers, pres. and genl. mgr., Douglas Bl Seattle, Wash., U. S. A., roundhouse. $40,

CONTRACTS AWARDED

Ala., Birmingham—PLANT—Ferro Enam Corp., 4150 E. 56 St., Cleveland, O., concre manufacturing plant, 7 Ave. and 32 St. N. H. K. Ferguson Co., Hanna Bldg., Clevela O. About $200,000.

Calif., Alameda—PLANT—Bethlehem-Al meda Shipyard, Inc., 2308 Webster St., Fa Bldg. 1, to Charles Stockholm & Sons, 447 ter St., San Francisco.

Calif., Long Beach—PLANT—G. A. B Engineering Co., 816 W. 5 St., one 60x16 and one 60x70 ft., steel frame hangar, story, 40x80 ft., frame and stucco office bld 1 story, 60x60 ft. frame machine shop fighter plane processing plant. Owner bui Est. $130,000.

Conn., New Haven—FACTORY—Wire Ro Corp. of America, 464 Congress St., 1 sto brick and steel factory. Owner builds (O $40,000. L. F. Caproni, 1221 Chapel St., e CD 1/27—ENR 12/30.

Ill., Carpentersville — FACTORY — Illi Iron & Bolt Co., 918 S. Michigan Ave., C cago, 1 story, 90x123 ft. factory, to H. Friestedt Co., 520 N. Michigan Ave., Chic $80,000.

N. J., Paulsboro—SHOP—Socony Vac Co., Paulsboro, 1 story, 65 x 163 ft. shop bl at refinery plant, to Turner Const. Co., Lexington Ave., New York, N. Y., $8 CD 12/6—ENR 12/9.

O., Cleveland—LABORATORY—Aluminu Co. of America, A. R. Crow, supt. of Constr tion, 2160 Harvard Ave., 2 story 191x17 brick, steel, concrete technical laboratory Albert M. Higley Co., 2026 E. 22 St., $400,000. Malcomber, Calder & Hammond, 1217 Griswold St., Detroit, Mich., archts. 12/8—ENR 12/16.

Pa., Donora — ACETYLENE GENERAT BLDG.—American Steel & Wire Co., H. Braden, mgr., Frick Bldg., Pittsburgh story, 14x60 ft., acetylene generator bldg. Monongahela River to Henretty Constr. 906 Century Bldg., Pittsburgh, G. H. Ro Rockefeller Bldg., Cleveland, O., and W. Dennis, engrs.

S. C., Greenville—RAYON MILL, etc Deering Millikin & Co., Inc., Church and Le ard Sts., New York, N. Y., rayon mill and houses, to Daniel Constr. Co., Greenville, $40,000. J. E. Sirrine & Co., Greenville, eng and archts. for mill.

Tex., Edinburg—PLANT—Central Pow Light Co., Edinburg, frozen food locker pl Owner builds. $40,000. CD 11/29—ENR 12/

Ont., Toronto—FACTORY—Maraul & W ris, archts., 46 Bloor St. W., 1 story, 90 ft. factory exten., for York Knitting M Ltd., 70 Crawford St., to Pigott Constr. Ltd., Pigott Bldg., Hamilton. About $ CD 12/24—ENR 12/30.

Proposal Advertisements see p. 172

Postwar Projects see p. 125